



Memorial Sloan Kettering
Cancer Center

PATIENT & CAREGIVER EDUCATION

Autologous Stem Cell Transplant: A Guide for Patients & Caregivers



Visit www.mskcc.org/pe/autologous_guide to view this guide online.

Table of Contents

Welcome and Overview	4
The Importance of Communication	5
How to Use This Guide.....	6
Stem Cell and Bone Marrow Basics	7
Understanding Your Autologous Stem Cell Transplant	7
Getting Ready for Your Transplant	9
Your Initial Consultation Visit.....	9
Getting Ready for Your Transplant	9
Your Pretransplant Evaluation.....	16
Your Preadmission Appointment.....	18
Having Your Tunneled Catheter Placed	19
What to Expect in the Hospital	22
What to Expect in the Cellular Immunotherapy Unit	25
What to Bring to the Cellular Immunotherapy Unit	26
What to Do in Your Home or Apartment	26
The 5 Phases of Transplant	28
Phase 1: Conditioning	29
Phase 2: Transplant Day to Engraftment	38
Phase 3: Engraftment to Day of Discharge.....	40
Phase 4: Early Convalescence	41
Phase 5: Late Convalescence	54

Educational Resources..... 55

- About Your Blood Transfusion*
- About Your Tunneled Catheter*
- Autologous Peripheral Blood Stem Cell Harvesting*
- Eating Well After Your Stem Cell Transplant*
- Hair Loss and Your Cancer Treatment*
- Hand Hygiene and Preventing Infection*
- How to Give Yourself an Injection of Filgrastim (Neupogen®) or Pegfilgrastim (Neulasta®) Using a Prefilled Syringe*
- Sexual Health and Intimacy*

Glossary 125

Welcome and Overview

This guide is designed to help you and your loved ones understand what to expect throughout your transplant journey. The information in this guide isn't meant to replace the information your transplant team will teach you. It's meant to be a resource that you can refer to throughout the transplant process.

In this guide, we'll explain some of the challenges you might have over the course of your transplant and recovery. But, this doesn't mean you'll have all of them. Because of that, you shouldn't compare yourself to other people you know or have heard of who had a stem cell transplant. Everybody is unique.

Stem cell transplants have been done for many decades. They've gotten much better over that time. But, a stem cell transplant is still a complex procedure that requires a commitment from you, your caregiver, and your transplant team.

Autologous transplants can be done safely while staying in the hospital (inpatient) or without staying the hospital (outpatient). This guide has information about both inpatient and outpatient transplants. But, an outpatient transplant isn't right for everyone. Your doctor will talk with you about whether an outpatient transplant is an option for you.

Having a transplant is a long process. Getting ready for your transplant is just the first part of your journey.

- If you have an inpatient transplant, you'll be in the hospital 24 hours a day before, during, and for some time right after your transplant.
- If you have an outpatient transplant, you and your caregiver(s) will stay at an apartment near the hospital approved by your doctor or at a furnished apartment at Memorial Sloan Kettering (MSK)'s 75th Street Patient Residence. These things will be discussed in more detail in this guide.

What's the difference between an inpatient and an outpatient transplant?

With an **inpatient transplant**, you'll stay in the hospital before, during, and right after your transplant.

With an **outpatient transplant**, you'll stay in an apartment near the hospital and come to the Cellular Immunotherapy Unit every day. You must have a caregiver to take care of you the whole time of your transplant.

If you have complications at any time during an outpatient transplant, you'll be admitted to the hospital. When it's safe, you'll leave the hospital and come to the Cellular Immunotherapy Unit like before. If you need to, you'll stay in the hospital for the rest of your transplant.

At MSK, you'll have a large transplant team working together to care for you as you go through each phase of your transplant. It's normal to have many emotional changes during the transplant process. Your transplant team includes many providers, including social workers, chaplains, psychiatrists, and members of our Integrative Medicine Department. All these healthcare providers are available to support and help you and your caregiver(s) cope with what you may feel.

The Importance of Communication

Throughout your transplant journey, it's very important to communicate clearly with your transplant team and caregiver about how you're feeling. If anything is bothering you, even if it seems small, tell a member of your transplant team. This is true for how you're feeling both physically and emotionally. It's very important not to let things build up. If you do, small problems can grow into larger problems. The more information you communicate to your transplant team, the more they can help you. There's usually something they can do to make you feel more comfortable.

Below are some of the ways you can communicate with your transplant team:

- Between 9:00 AM and 5:00 PM, call your doctor's office. After 5:00 PM, call 212-639-2000 and ask for the doctor covering bone marrow transplant.
- If you're having an outpatient transplant and it's between 9:00 AM and 7:00 PM, call the Cellular Immunotherapy Unit at 646-608-3150. After 7:00 PM, call 212-639-2000 and ask for the doctor covering bone marrow transplant.
- If you're in the hospital, talk with any member of your inpatient transplant team or ask to speak with the Charge Nurse, Clinical Nurse Specialist, or Nurse Leader. While you're inpatient, it's important to talk with your inpatient team, not call the outpatient office. Also, you should choose 1 caregiver to call the nursing station for updates, then that person can relay the information to the rest of your friends and family.
- Use your MyMSK account. MyMSK is MSK's patient portal. You can use MyMSK to ask questions about your appointment schedule, request a prescription refill, or request patient education information. Never use MyMSK to communicate any symptoms to your transplant team. You'll get more information about MyMSK at your initial consult visit. You can also read the resource *Communicating With Your Care Team: When to Call or Use MyMSK*. You can find it online at www.mskcc.org/pe/communicating_using_mymsk or ask a member of your transplant team for a copy.

About PROMIS

Your transplant team will also use MyMSK to check in about how you're feeling physically and mentally over time. The set of questions they'll send is called PROMIS. Your transplant team will send PROMIS questions to your MyMSK account:

- On or near the day you start treatment.
- On the day of your stem cell infusion.
- Every 7 days for the first month after your stem cell infusion.
- Every month for the first year after your stem cell infusion.
- Every 3 months for the second year after your stem cell infusion.

If you report any concerning symptoms when you're filling out the PROMIS questions, you'll either see a message asking you to call your healthcare team or a member of your transplant team will call you to help. Your answers will also help us know how people generally feel after an autologous stem cell transplant so we can improve our care for the future.

How to Use This Guide

There's a lot of information to read and understand in this guide. Read the entire guide at least once, including the additional resources included in the back. You may find it easier to read a few sections at a time rather than trying to read the entire guide at once. We encourage you to refer to this guide as your treatment progresses.

We recommend that you highlight or write notes on anything that you don't understand or have a question about. There's no such thing as a silly question, so please ask about anything that's on your mind.

Glossary

We've done our best to limit the number of medical terms in this guide. But, there are some words that are important for you to understand. With this in mind, we've included a glossary of useful terms at the back of this guide.

Stem Cell and Bone Marrow Basics

Hematopoietic (hee-MA-toh-poy-EH-tik) stem cells (usually just called stem cells) are immature cells that grow into all the blood cells in your body: the white blood cells that fight infection, red blood cells that carry oxygen, and platelets that help control bleeding. Your stem cells are constantly dividing and changing into these different types of blood cells to replace older blood cells. Stem cells also divide to make newer stem cells.

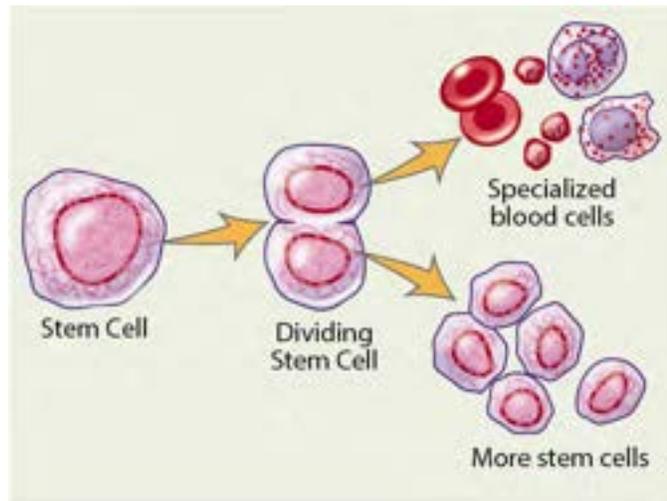


Figure 1. Your stem cells divide and change into the different types of blood cells in your body

Most of the stem cells in your body are in your bone marrow (the soft tissue in the spaces in the center your bones). Bone marrow is mostly found in the larger bones in your body, such as your hip, breastbone, and pelvis. A few stem cells are also found in your bloodstream.

You might hear your transplant called a **stem cell transplant** or a **bone marrow transplant**. A bone marrow transplant is a specific type of stem cell transplant. With a bone marrow

transplant, the stem cells are taken from your bone marrow. With a stem cell transplant, the stem cells are taken from either your bone marrow or your bloodstream.

What's the difference between a stem cell transplant and a bone marrow transplant?

A **bone marrow transplant** means the stem cells are taken from your bone marrow.

A **stem cell transplant** means the stem cells are taken from either your bone marrow or your bloodstream.

Understanding Your Autologous Stem Cell Transplant

When you have an autologous stem cell transplant, your stem cells are harvested (collected) from your body and frozen. “Autologous” means the stem cells come from yourself. The 2 general sources of stem cells that can be used in an autologous stem cell transplant are:

- **Peripheral blood stem cells.** These are collected from your bloodstream through a process called apheresis (a-feh-REE-sis). To increase the amount of stem cells in your bloodstream, you'll get injections (shots) of a medication that causes your body to make more stem cells than usual. The stem cells escape from your bone marrow into your bloodstream, where they can be collected easily while you're awake.

For more information, read the resources *Autologous Peripheral Blood Stem Cell Harvesting* and *How to Give Yourself an Injection of Filgrastim (Neupogen®) or Pegfilgrastim (Neulasta®) Using a Prefilled Syringe*. You can find them in the "Educational Resources" section of this guide.

- **Bone marrow stem cells.** These are collected from your bone marrow through a procedure called bone marrow harvesting. The procedure is done in the operating room while you're asleep. Most people go home the same day of the procedure.

For more information, read the resource *About Bone Marrow Harvesting*. You can find it at www.mskcc.org/pe/bone_marrow_harvesting or ask a member of your transplant team for a copy.

After your stem cells are harvested, you'll get high doses of chemotherapy or a combination of chemotherapy and radiation therapy. This is called conditioning. The high-dose treatment kills cancer cells, but also eliminates the blood-producing stem cells that are left in your bone marrow.

After your conditioning, the stem cells that were collected will be given (transplanted) back to you. This lets your bone marrow make new blood cells. These things will be discussed in more detail later in this guide.

Getting Ready for Your Transplant

Your Initial Consultation Visit

During your initial consultation visit, you'll meet with your doctor and other members of your transplant team. Your doctor will take a complete medical and surgical history, do a physical exam, and talk with you about what they think is the best treatment plan for you. This plan may also be discussed with other transplant doctors to make sure everyone agrees on the best plan for your specific situation.

Getting Ready for Your Transplant

Before your transplant, you'll make practical, physical, and emotional preparations for your transplant. Here's a list of things that will happen and things you might need to do to get ready:

Learn about your transplant. The information your transplant team will go over with you is meant to help you learn, not scare you. Make a note of anything that you don't understand about your transplant, anything in this guide that isn't clear, and any other questions you have.

Contact your insurance company. It's a good idea to contact your insurance company before your transplant to see if there's a dedicated case manager for you.

Choose a caregiver. Identify a family member or friend to act as your caregiver. Make sure this person understands what the role entails. Give your caregiver a copy of this guide and ask them to read it at least once.

- If you're having an inpatient transplant, it's important that you have a caregiver when you're discharged from the hospital.
- If you're having an outpatient transplant, you'll need a caregiver to stay with you whenever you aren't in the Cellular Immunotherapy Unit.

Fill out a Health Care Proxy form. A health care proxy is a legal document that identifies the person who will speak for you if you can't communicate for yourself. The person you identify is called your health care agent. This person can be different from your caregiver.

For more information, talk with your social worker or any other member of your transplant team. You can also read the resource *Advance Care Planning*. You can find it online at

www.mskcc.org/pe/advance_care_planning or ask a member of your transplant team for a copy.

Meet with a social worker. Your social worker will explain the psychological, emotional, and financial support services offered by the social work team.

Arrange for disability or a leave of absence from work. If you're working, make arrangements to go on disability or take a leave of absence. You should plan to be away from work for about 6 months, but the exact length of time is different for everyone.

Make decisions about your fertility. If fertility (the ability to have children naturally) is a concern for you, talk with your transplant team about your options. Ask for an appointment with a fertility specialist to discuss how your treatment may affect your ability to have children in the future and the steps you can take to preserve your fertility. You can also read the resources below for more information. You can find them online or ask a member of your transplant team for a copy.

- *Fertility Preservation Before Cancer Treatment: Options for People Born with Ovaries and a Uterus*
www.mskcc.org/pe/fertility_starting_treatment
- *Building Your Family After Cancer Treatment: For People Born With Testicles*
www.mskcc.org/pe/building_family_born_testicles
- *Sperm Banking*
www.mskcc.org/pe/sperm_banking

Arrange for childcare and pet care, if needed. If you have concerns about talking with your children about your transplant, your social worker can help guide you.

Make decisions about your hair. The chemotherapy that kills cancer cells also kills the cells that make your hair. Most people lose their hair during their transplant. Think about if you'd like to cut your hair. If you decide to wear a wig, visit a wig store as soon as you can. That way, you can find one that closely matches your natural hair, if you want to.

Have your pretransplant evaluation. You'll have a series of medical tests. Your clinical nurse coordinator will review which tests are needed. Your doctor's office coordinator will work with you to try to schedule these tests at a time that's convenient for you.

Meet with a clinical dietitian nutritionist, if needed. If you have specific nutritional needs, you'll meet with a clinical dietitian nutritionist to review special dietary requirements and safe food handling. If you want to meet with a clinical dietitian nutritionist, ask your nurse for a referral.

Meet with a pharmacist. The pharmacist will go over all the medications you'll take before and after your transplant.

Your Transplant Team

A team of healthcare providers will care for you throughout your treatment. You'll meet many of them as you progress through your transplant journey. You might not meet some members, such as your doctor's office coordinator, laboratory staff, or our service coordinator, but know that they're all working to help you. Below is a list of your team members and their roles.

An **attending doctor** will be in charge of your care throughout your treatment. Even though one specific doctor will be your primary outpatient doctor, different doctors might care you for while you're in the hospital.

A **fellow** is a doctor who has finished general training and is getting more training in cancer care.

An **advanced practice provider (APP)** is a healthcare provider who works with your doctor to provide you with care. They can give medical treatments and prescribe medications. They may also sometimes see you instead of your doctor. APPs include **nurse practitioners (NPs)**, **physician assistants (PAs)**, and **certified registered nurse anesthetists (CRNAs)**.

A **clinical nurse coordinator** is a nurse who will communicate and work with you, your caregiver, and your team of doctors to organize and schedule the testing, procedures, and consultations with other professionals needed before your transplant. Your clinical nurse coordinator will teach you about your specific treatment plan.

Nursing staff will work with you when you're seen at outpatient visits and while you're in the hospital. They're registered nurses (RNs) specially trained in the care of people having a stem cell transplant. Each outpatient nurse works with 1 or 2 attending doctors and will meet you at the time of your initial consultation visit. Your outpatient nurse will see you at many of your outpatient visits after discharge and will follow you along your transplant journey. During your transplant, either inpatient or outpatient, you'll have a team of primary nurses that will care for you. The nurses work 12-hour shifts and try to maintain consistency with who will be working with you. Both the inpatient and outpatient nurses work closely with your transplant team to manage any symptoms and can help you with any questions or concerns you may have.

A **nursing assistant** or **patient care technician (PCT)** provides basic care and support under the direction and supervision of a registered nurse.

A **hospitalist** is a doctor who sees people only while they're in the hospital. At MSK, there's a hospitalist on duty all night.

A **clinical pharmacist** who specializes in the care of people having stem cell transplants will review your medications with you and your caregiver, teach you how to take them properly, and tell you about any side effects they might cause.

A **social worker** will help you, your family, and your friends manage the stress that comes with the transplant process. Social workers understand the issues faced by people having transplants and are available to listen, offer counseling, and refer you or your loved ones to other resources and services.

A **transplant service coordinator** will work with you and your insurance company to determine your transplant benefits. This person is familiar with the insurance issues faced by people having transplants. Each insurance company has its own policies and requirements. When your insurance company needs authorization, your transplant service coordinator will help with that process.

Office coordinators provide administrative support to your attending doctors and their nurses. You might speak with them when you submit information, are scheduling an appointment, or have questions for your transplant team. Office coordinators are sometimes called physician office assistants (POAs).

Care coordinators work in the outpatient areas and monitor the flow of patients in and out of the clinic. They make sure that patients have all of the tests, scans, and treatments the medical team orders either completed or scheduled. Care coordinators also manage patients' medical records and coordinate their future appointments. Care coordinators are sometimes called session assistants (SAs).

A **clinical research coordinator** works with your transplant team and will talk with you and explain some of the research studies at MSK that you might be able to participate in. These studies don't include anything that's related to your particular treatment. They mostly concern collecting samples or data. Clinical research coordinators are sometimes called research study assistants (RSAs).

Patient representatives are liaisons between patients and families and MSK staff. They're here to protect your rights and help explain hospital policies and procedures. Patient representatives can help you with any concerns about your care and help you communicate with members of your transplant team.

A **clinical dietitian nutritionist** is a food and nutrition expert who will assess your nutritional status, talk with you and your caregiver about your diet, and give you advice about changing your diet to help manage your symptoms and side effects.

A **physical therapist (PT), occupational therapist (OT)**, or both will see you while you're in the hospital. They'll work with you to help you keep up your strength and stamina during your recovery.

A **room service associate** will explain how the room service works, including the hours it's available and how to use it. They'll make sure you get the right menus and deliver your meals.

A **case manager** will see you while you're in the hospital, give required updates to your insurance company, and help you arrange transfer to home or another facility, if needed.

Your Caregiver

Everyone having a transplant will benefit from having support from a caregiver before, during, and after their transplant. The caregiver is usually a family member or a close friend available to help with basic day-to-day medical and practical issues, as well as provide emotional support.

To have an outpatient transplant, you must have a clear caregiver plan. There are no exceptions. Your transplant team will review this with you. Your caregiver must be available 24 hours a day, 7 days a week during your transplant.

Your transplant team will give your caregiver specific instructions about what they to do. Some of your caregiver's responsibilities will include:

Medical support

- Gathering information from your transplant team.
- Caring for your catheter.
- Making sure you take your medications and keeping a written record of when you take them.
- Taking your temperature every 4 hours while you're awake and away from the Cellular Immunotherapy Unit.
- Keeping a written record of your temperatures.
- Keeping a written record of how much liquid you drink every day.
- Noticing any changes in your condition.
- Telling your transplant team about any new symptoms you have or changes in your condition.
- Calling for medical help in an emergency.

Practical support

- Escorting you to and from your daily visits at the hospital.
- Dealing with financial and insurance issues.
- Preparing your meals according to a food safe diet.
- Keeping the place you're staying (75th Street Residence, apartment, or house) clean.

- Keeping family members and friends up to date about your condition.
- Managing the number of visitors you have and keeping you away from anyone who is sick.

Emotional support

- Paying attention to your moods and feelings.
- Communicating with you and listening to you.
- Understanding your needs and decisions.

Choosing the Right Caregiver

During an outpatient transplant, being a caregiver is a full-time, 24-hour, 7-day a week responsibility. It's tiring, demanding, and stressful, especially if your condition, schedule, or treatment changes.

If you don't have just 1 person to serve as your caregiver, then it's okay to have more than 1 person share the role. However, it's best to limit the number of caregivers to 1 or 2 people.

During your transplant, your caregiver must take you to and from your daily visits to the Cellular Immunotherapy Unit. They may not be able to work and will need to stay with you for most of the day and night. While you're in the Cellular Immunotherapy Unit during your daily visits, your caregiver can take some personal time. This is something we strongly recommend.

If you're having an inpatient transplant, it's still important that you have a caregiver plan for when you're discharged from the hospital. Although the time frame for 24/7 caregiver support may vary, it's generally recommended that you have a full-time caregiver for the first 2 weeks after your discharge.

For inpatient transplants your caregiver's medical support responsibilities include:

- Making sure you take your medications
- Making sure you're drinking enough fluids and have adequate nutrition
- Noticing any changes in your condition
- Calling for medical help in an emergency

Caregiver responsibilities in terms of practical support and emotional support are the same whether your transplant is done as an inpatient or as an outpatient.

It's important for your caregiver to stay positive, calm, and flexible while providing you with the support and encouragement you need. It's also important for you to understand that the

caregiver role is challenging and that your caregiver might at times feel overwhelmed by the responsibilities.

Take time now to think about who you want to be your caregiver. It should be somebody you trust and who can take the time to care for you. Your caregiver should be someone who can offer you the practical and emotional support you need.



If your caregiver gets sick or shows any signs of a cold or flu (such as a cough, fever, or sore throat) 1 week before or at any time during your transplant, tell your transplant team right away.

Resources for caregivers

Caregivers can have physical, emotional, spiritual, and financial distress. Resources and support are available to help manage the many responsibilities that come with caring for a person having a transplant. For support resources and information, contact your transplant social worker. You may also find the resource *Caregivers' Guide for Bone Marrow/Stem Cell Transplant* helpful. You can find it online at www.msccc.org/pe/caregivers_guide_bmt and at the end of this guide.



At MSK, our Caregivers Clinic provides support specifically for caregivers who are having a hard time coping with the demands of being a caregiver. For more information, go to www.msccc.org/cancer-care/doctor/allison-applebaum or call Dr. Allison Applebaum at 646-888-0200.

Coping with Separation from Your Children

Whether you're having an inpatient or outpatient transplant, being apart from your children will be hard for you and your family. We strongly recommend that you talk with your social worker about your concerns and develop a plan to maintain strong ties to your children during your transplant.

Below are some things that others have done to remain in contact with their children during their transplant.

- Talk with your children regularly using programs or apps like Skype, Google Hangouts, or FaceTime. Set up a time that you talk to them each day, such as when they get home from school and before they go to bed. Get into a routine of using the computer to see and talk to them.

- Paint or create other crafts to send home. Ask a member of your transplant team to arrange for volunteers from the Patient Recreation Center to bring you supplies.
- Use your cell phone or a tape recorder to record yourself reading your children’s favorite stories. Upload these recordings to the web, give them to your caregiver, or e-mail them to your children. They can read along with these stories while listening to your voice.
- Keep copies of your children’s favorite stories with you in your room. At night, you can use Skype to read along with them before they go to sleep.
- Decorate your room with your children’s artwork and pictures of your family.
- Give your children a special coloring book or journal for times when they miss you or when feelings are difficult. Your caregiver can bring the colorings to you. You can talk with your child about them over Skype or on the phone.

We know that nothing will replace physical contact between you and your children, but we strongly encourage you to use all of the technology that’s available to maintain a strong bond with them while you’re away.

For more help maintaining your relationship with your children, contact your social worker.

Your Pretransplant Evaluation

Before you become a transplant candidate, your overall physical condition will be evaluated. You’ll need to make several trips to MSK to have tests. We often call this the “work-up” or “restaging” period. During the work-up, you’ll need to have some, but not always all, of the following tests.

- **Chest x-ray.** This is done to make sure your lungs are clear and there’s no sign of infection or other problems.
- **Blood tests.** These are done to check several things, including your kidney function, liver function, blood counts, and past exposure to certain viruses.
- **Urine test.** This is done to see if there’s anything abnormal in your urine (pee).
- **Electrocardiogram (EKG) and echocardiogram (echo).** These are done to give your transplant team information about your heart.
- **Pulmonary function tests (PFTs).** These are breathing tests that measure how well your lungs work.
- **Computed tomography (CT) scan.** This is a radiology test that gives more detailed images of soft tissue and bone than a standard x-ray. Sometimes, CT scans use

contrast dye that you drink or have injected into your veins. It's very important to tell your doctor if you know you have an allergy to contrast dye, seafood, or iodine. If you have a mild allergy, you can still have contrast dye, but you'll need medications before getting the dye to prevent a reaction.

- **Positron emission tomography (PET) scan.** This is a radiology test that's used to look at certain types of cancer, as well as your organs and how they work in your body.
- **Dental exam.** You must have a full dental exam before your transplant. Any cavities, loose fillings, or gum disease should be taken care of before your transplant. This can be done by your own dentist or by a dentist here at MSK. If you see your own dentist, ask for a letter saying that you have no dental problems. If there are issues, ask your dentist to contact your doctor's office to discuss them. Your dental exam can be done up to 3 months before you're admitted to the hospital for your transplant.
- **Bone marrow aspiration and biopsy.** A bone marrow aspirate is a small sample of bone marrow, usually taken from the back of your hip. Your hip will be numbed, a needle will be put into the bone marrow, and a small amount of bone marrow liquid will be taken out. A bone marrow biopsy might be done at the same time. This biopsy involves collecting a tiny piece of bone for examination. This is done to check how well your bone marrow is making cells and to look for any sign of cancer in the marrow.
- **Lumbar puncture (spinal tap).** This is done to check for abnormal cells in your cerebrospinal fluid (CSF). This is the fluid that surrounds your brain and spinal cord. A small needle will be put through your back and a small amount of CSF will be collected. A lumbar puncture is only done for certain types of leukemia and lymphoma. Sometimes, chemotherapy is injected into your CSF to keep the cancer from spreading there or to treat cancer if it's already there.
- **Skeletal survey.** This is done to look for bone damage caused by cancer. It's usually only done for people who have multiple myeloma. It involves taking x-rays of the major bones in your body. It can take a few hours.
- **Consultation with a radiation oncologist.** If you're having radiation therapy as part of your conditioning, you'll meet with your radiation oncologist to go over your treatment plan. You might also have a CT scan, PET scan, or both during this visit. They'll be used to plan your treatment. You'll also have a treatment planning session called a simulation. During this session, several imaging scans are taken, along with measurements of your chest. These are used to make lead shields. Your lungs are very sensitive to radiation and the shields will be used to protect them during some of the treatments.

These tests are usually done in the 30 days before your transplant (Day –30 onwards), but sometimes the pretransplant evaluation can take longer. Your clinical nurse coordinator will work with you and your caregiver to schedule the tests. The results of the tests will be used to plan your treatment and make sure it's safe to start your treatment.

Your doctor or nurse will explain any other tests that you might need.

Your Preadmission Appointment

Once your pretransplant evaluation is finished and you have the date of your transplant, you'll have your preadmission appointment. This appointment is usually 1 to 2 weeks before you're admitted to the hospital. At this appointment:

- Your doctor will review your treatment plan with you.
- Your doctor will go over the consent forms and you'll sign consent for your transplant (if you haven't already).
- You'll meet with your clinical nurse coordinator. They'll give you a calendar outlining your treatment plan, review information, and answer your questions.
- You'll meet with your clinical pharmacist again to review the medications you'll take during and after your transplant.
- You may be asked to sign a consent form for transfusion (if you haven't already). This is because you may need blood or platelet transfusions when your blood counts are low after your transplant. For more information, read the resource *About Your Blood Transfusion*. You can find it in the "Educational Resources" section of this guide.



Between your preadmission appointment and when you're admitted to the hospital, it's very important to call your transplant doctor's office if you or anyone in your home has any of the following:

- Signs of a cold, such as:
 - A runny nose
 - Congestion
 - A cough
 - A fever of 100.4 °F (38.0 °C) or higher
- Nausea (feeling like you're going to throw up)
- Vomiting (throwing up)
- Diarrhea (loose or watery bowel movements)
- A toothache
- An open wound
- Any other new problem, even if it seems small

Your doctor will decide if your admission for transplant should be delayed. It could be very dangerous to start your chemotherapy while you have an infection, even if it's just a cold. This is because your immune system won't be able to fight the infection.

Having Your Tunneled Catheter Placed

You'll need a tunneled catheter during your transplant. A tunneled catheter is a type of central venous catheter (CVC). It's a tube that's put into a large vein in your upper chest (see Figure 2). Outside your body, the catheter divides into 2 or 3 smaller tubes called lumens (see Figure 3).

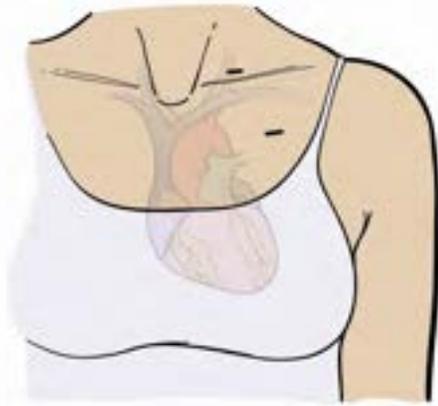


Figure 2. Veins and your heart



Figure 3. Tunneled catheter

A tunneled catheter lets your transplant team infuse your stem cells, draw your blood, and give you fluids, electrolytes, blood transfusions, chemotherapy, and other medications without having to keep sticking you with a needle. Having a tunneled catheter will make your treatment much more comfortable.

- Most people having an inpatient transplant have their tunneled catheter placed on the day they're admitted to the hospital.
- Most people having an outpatient transplant have their tunneled catheter placed the day before they're admitted to the Cellular Immunotherapy Unit.

Sometimes, it may need to be placed a few days before hospital admission.

The procedure to place your tunneled catheter will be done in the Interventional Radiology department at Memorial Hospital (MSK's main hospital). Your clinical nurse coordinator will talk with you about the details of having your tunneled catheter placed. For more information, read the resource *About Your Tunneled Catheter*. You can find it in the "Educational Resources" section of this guide.

After Your Tunneled Catheter is Placed

After your tunneled catheter has been put in, you'll be monitored until you're fully awake.

- If your tunneled catheter is being placed on the day you're being admitted to the hospital, you'll be taken to the inpatient stem cell transplant unit once you're fully awake. The inpatient nursing staff will care for your tunneled catheter while you're in the hospital.
- If your tunneled catheter is put in a few days before you're admitted to the hospital, you'll be discharged once you're fully awake. You must have a caregiver with you if

you're going home after your tunneled catheter is placed. Your nurse will change the dressing, if needed.

Keep your tunneled catheter secure at all times to avoid pulling it. You can tape the lumens of your tunneled catheter to your skin, tuck them into a bra if you wear one, or secure them to your clothing. Ask your nurse about the best way to secure your tunneled catheter. You can find more information about caring for your tunneled catheter in the resource *About Your Tunneled Catheter*.

Your tunneled catheter is usually taken out 2 to 3 weeks after your transplant.

What to Expect in the Hospital

This section has basic information about what to expect if you're admitted to the hospital during any part of your transplant. This applies whether you have an inpatient or outpatient transplant.

There are 2 transplant units in Memorial Hospital. The nurses on each unit are specially trained to care for people having transplants, and all the same guidelines are followed on both floors. You may need to change your room or floor while you're in the hospital. We try to avoid this as much as possible.

Your primary nursing team will care for you during your hospital stay. Nurses usually work 12-hour shifts starting at either 7:00 AM or 7:00 PM. When nursing shifts change, your nurse will share the information about what happened with you and your care during that shift with the nurse taking over.

What to Expect

- You'll be in protective isolation to lower your risk of getting an infection. Anyone who goes into your room must clean their hands and wear a mask and gloves. For more information, read the resource *Hand Hygiene and Preventing Infection*. You can find it in the "Educational Resources" section of this guide.
 - Sometimes, you might need extra isolation precautions. A sign telling your visitors about the type of isolation and what they need to do will be put on the door to your room.
 - Even though you're in isolation, you can have visitors 24 hours a day, every day. We recommend that no more than 2 visitors be in your room at once.
 - Children 10 years or older can visit you as long as they follow the isolation procedures. For more information about visitors, read the "Visitors" section below.
- You'll be in a private room that has a bathroom for your use only. Your room will have Wi-Fi and a TV with cable channels.
- You'll be connected to an IV pole with electronic pumps during most of your hospital stay.
- If you're at risk of falling, someone will be available to help you go to the bathroom. Your treatment team will tell you more about how to prevent falls. You can also read the resource *Call! Don't Fall!* You can find it online at

www.mskcc.org/pe/call_dont_fall or ask a member of your transplant team for a copy.

Testing and Evaluations

Before 6:00 AM every day, a member of your transplant team will weigh you and take a sample of your blood. Your blood will be checked to see how your white blood cells, red blood cells, and platelets are recovering. Other blood tests will be done as needed to check your kidney and liver, monitor for infections, check the level of chemotherapy or other medications in your blood, and to help evaluate your overall condition.

Your vital signs will be taken every 4 hours, even during the night. Your urine will be measured daily. It's important that we know how much urine you're making.

Visitors

- All visitors must follow infection control precautions posted on your door, such as washing their hands, wearing a mask, and telling someone if they might be sick.
- All visitors must clean their hands each time before they enter your room.
- All visitors must remove their mask, gloves, and gown before leaving your room.
- Visitors and caregivers must use the visitor's restroom in the hallway, not the restroom in your room. This is to minimize the spread of bacteria in your room.
- Fresh-cut, live, or dried flowers and plants aren't allowed in your room. Please tell family and friends not to bring or send them.
- The following people shouldn't visit you:
 - Anyone who has symptoms of an illness (such as a cough, rash, fever, or diarrhea)
 - Anyone who thinks they may be getting sick
 - Anyone who could have recently been exposed to someone with an infectious illness
 - Children younger than 10 years old

Exercise

Even though you'll feel tired after your chemotherapy and transplant, you should still try to stay active and get out of bed every day. It's important to be safe, so ask for help when you get up.

We encourage you to walk around the unit. You must wear a mask and gloves while you're walking around the unit. Your nurse will tell you if you also need to wear an isolation gown. Don't leave the floor for walking or exercise.

A physical therapist will evaluate you early during your hospitalization and prescribe an exercise program that's right for you.

Communication

Each room has a call bell system that's monitored 24 hours a day, 7 days a week. If you need something, please use your call bell and say exactly what you need so we can send the right member of your transplant team to help you.

Diet

Your transplant team will plan your diet. You'll be given a menu and instructions on how to order your meals. Room service will deliver your meals to you.

In general, everyone having a transplant is placed on a food safe diet. Your clinical dietitian nutritionist will discuss this with you. For more information, read the resource *Eating Well After Your Stem Cell Transplant*. You can find it in the "Educational Resources" section of this guide.

If you keep kosher, have diabetes, or follow other specialty diets, tell your clinical dietitian nutritionist so that we can prepare your meals properly. Your clinical dietitian nutritionist is also available to help you plan your meals.

Showering

You'll be expected to shower daily. Your patient care technician will be in your room when you're showering to help you and to make sure you're safe.

Mouth Care

It's important to take good care of your mouth. This will help to reduce infections and mouth sores. Your nurse will go over this with you.

What to Expect in the Cellular Immunotherapy Unit

During an outpatient transplant, you'll get all your care in the Cellular Immunotherapy Unit. This includes your chemotherapy, transplant, and post-transplant care.

The Cellular Immunotherapy Unit is on the 12th floor of the David H. Koch Center for Cancer Care at Memorial Sloan Kettering. Arrive at the unit at your scheduled time every day. You'll only be admitted to the hospital if you need more care than you can get as an outpatient.

When you come to the Cellular Immunotherapy Unit, wear comfortable clothing that allows for easy access to your tunneled catheter. Shirts that open at the front, sweatshirts, or large t-shirts are good choices. Don't wear clothing that's hard to take off or put back on.

After you check in and are taken to a room, your transplant team will check your vital signs and weight and ask about any symptoms you have. They'll also examine you and check your blood counts, electrolyte levels, and kidney function.

After they examine you, you'll wait in your room for your test results to be ready. This can take several hours. You'll have an entertainment unit with a TV and a computer to pass the time. Your meals will be provided. This is a good time for your caregiver to take a break, take some personal time, or run errands. We highly recommend they do. You'll be safe in your transplant team's care.

Once they get the results from your blood tests (sometimes called "labs"), your transplant team will make decisions about your care. The rest of your visit that day will depend on your test results. Based on your test results:

- Your healthcare provider may give you fluids through your IV.
- Your healthcare provider may give you an infusion of platelets, red blood cells, or other blood components.
- Your healthcare provider may change some of your medications.
- Your treatment could be left as is.

You'll stay in the unit until all the treatments you need are completed. After that, your caregiver will take you back to your nearby apartment or the 75th Street Residence. There, they'll continue to monitor your temperature and how much liquids you drink.

For more information, read the resource *About Your Appointments in MSK's Cellular Immunotherapy Unit*. You can ask a member of your transplant team for a copy or find it online at www.mskcc.org/pe/about_cellular_immunotherapy_unit

What to Bring to the Cellular Immunotherapy Unit

- A list of all prescription and nonprescription medications you're taking, along with dosages and how often you take them. This should include patches, creams, vitamins, nutritional supplements, herbal products, and over-the-counter medications.
- All the prescription medications you were told to take during the transplant period.
- Your *Outpatient Cellular Therapy Temperature & Liquid Intake Log*. Your caregiver will use this to keep track of your temperature and liquid intake while you're away from the unit. A member of your transplant team will give you a copy. You can also find it online at www.mskcc.org/pe/cellular_therapy_log
- Books, newspapers, an audio player, a laptop, or tablet computer—whatever you need to pass the time.
- A notebook to write down information and any questions you or your caregiver have.

What to Do in Your Home or Apartment

Keep Track of Your Temperature

From the time you start receiving your chemotherapy, your caregiver must take your temperature and write it in the *Outpatient Cellular Therapy Temperature & Liquid Intake Log* every 4 hours while you're away from the Cellular Immunotherapy Unit. You'll be given a thermometer.

If your temperature is 100.4 °F (38 °C) or higher, your caregiver needs to take you to Urgent Care Center as instructed in your *Outpatient Cellular Therapy Emergency Guide*. A member of your transplant team will give you a copy. You can also find it online at www.mskcc.org/pe/cellular_therapy_emergency_guide

While you're on your way to the UCC, call one of the numbers listed below.

- Between 8:00 AM and 7:00 PM, call the Cellular Immunotherapy Unit at 646-608-3150.

- After 7:00 PM, call 212-639-2000. Ask for the doctor covering bone marrow transplant.

Keep Track of How Much You Drink

Drink 2 liters (64 ounces) of liquids every day. Try to drink a small amount steadily throughout the day. Your caregiver must keep track of all the liquids you drink in the *Outpatient Cellular Therapy Temperature & Liquid Intake Log*.

Watch for Bleeding

If you have any bleeding, always tell someone from your transplant team. If you notice you're bleeding and you aren't in the Cellular Immunotherapy Unit, take the following steps right away.

1. Apply direct pressure on the bleeding site. If you're bleeding from your nose, also apply ice over the bridge of your nose.
2. Follow the *Outpatient Cellular Therapy Emergency Guide*.
 - Between 8:00 AM and 7:00 PM, call the Cellular Immunotherapy Unit at 646-608-3150.
 - After 7:00 PM, call 212-639-2000. Ask for the doctor covering bone marrow transplant.



Call your doctor right away if you have any of the following things while you're not in the Cellular Immunotherapy Unit:

- Black bowel movements, blood in your stool, or rectal bleeding
- Blood in your urine
- A headache that doesn't get better, blurred vision, or dizziness
- Coughing up blood, vomiting blood, or a nosebleed that doesn't stop after a few minutes with applied pressure or ice

The 5 Phases of Transplant

There are 5 phases of transplant. They are:

1. Conditioning
2. Transplant day to engraftment
3. Engraftment to day of discharge
4. Early convalescence
5. Late convalescence

These phases are described in the table below. They're also described in more detail in the following pages.

The phases and time frames aren't exact, and there's some usually some overlap from one phase to the next. Everyone's transplant timeline is unique.

	Description	Time period
Phase 1: Conditioning	<ul style="list-style-type: none"> • You'll get chemotherapy with or without radiation therapy. This will kill any cancer cells left in your body. It'll also make room for new stem cells and suppress your immune system so you don't reject them. • Phase 1 will be finished when you get the infusion of stem cells. 	Day of hospital admission to Day 0 (transplant day). The start date varies depending on which conditioning regimen you have.
Phase 2: Transplant day to engraftment	<ul style="list-style-type: none"> • You'll feel the effects of your conditioning regimen. • Your white blood cell, red blood cell, and platelet counts will be low. • You may have diarrhea, nausea, vomiting, or mouth sores. • Your risk of getting an infection will be high. • You may need blood transfusions. 	Day 0 to engraftment (blood count recovery). Engraftment is usually between Day +10 and Day +30.

	Description	Time period
Phase 3: Engraftment to day of discharge	<ul style="list-style-type: none"> Your blood counts will recover and gradually increase. You'll start the healing process. 	Blood count recovery until discharge.
Phase 4: Early convalescence	<ul style="list-style-type: none"> Your blood counts will be recovering, but your immune system still won't be working properly. You'll still be at risk of getting an infection. You'll keep taking certain medications to prevent infection. You'll continue to be monitored closely by your transplant team. 	Discharge to 1 year after transplant (or longer).
Phase 5: Late convalescence	<ul style="list-style-type: none"> Your immune system will be almost fully recovered and you'll go back to your normal activities. There will still be a chance that you could develop late complications, such as organ dysfunction or recurrence of the original disease. You'll start getting vaccinations you may have had as a child. 	1 year after transplant and onward.

Phase 1: Conditioning

Conditioning is another name for the treatment you'll get to get your body ready for the transplant. It's done to kill any cancer cells that are still in your body.

During conditioning, you'll get high doses of chemotherapy. The chemotherapy you get depends on your cancer type, treatments you've had before, and your treatment plan. You may also get radiation therapy along with the chemotherapy.

The day of your stem cell transplant is called Day 0. The days before transplant are negative numbers and days after transplant are positive numbers.

Conditioning starts before transplant, so the days of chemotherapy are assigned negative numbers (for example, Day -4, Day -3, Day -2, Day -1). Depending on your treatment plan, you may have 1 or more days of chemotherapy.

Every day after your transplant is referred to as a positive-numbered day (such as Day +1, Day +2).

Your nurse coordinator will work with you to plan your schedule, give you a treatment calendar, and tell you the date of your treatment. Your transplant team will usually know an approximate time for your transplant 1 day before stem cell infusion on Day 0.

Before you get your chemotherapy, a number of safety checks will be done to make sure everything is correct. Once all the safety checks have been completed, your nurse will give you IV fluids (to keep you hydrated), anti-nausea medication, and the chemotherapy medication through your tunneled catheter (see Figure 4).



Figure 4. Getting chemotherapy through your tunneled catheter

Side Effects of Conditioning

Conditioning kills cancer cells, but it also kills normal cells that are dividing. This causes side effects, including fatigue (feeling tired), low blood cell counts, temporary loss of immune function, hair loss, mouth sores, nausea, vomiting, diarrhea, and infertility (not being able to have children naturally).

Your transplant team will help you and your caregiver understand and get ready for these side effects. Before you start treatment, make a list of questions you would like to ask about these side effects. Talk through these questions with your caregiver and transplant team.

Fatigue

It's normal for conditioning to cause fatigue. You should still try to stay as active as you can throughout your transplant. Limit the amount of time you spend in bed and walk a little every day. Your physical therapist will recommend activities for you.

Low white blood cell count (neutropenia) and risk for infection

One side effect of treatment is called neutropenia. Neutropenia is a condition in which you have a lower than normal number of neutrophils (a type of white blood cell) in your bloodstream. Neutrophils play a crucial role in your immune system—they're one of the first types of cells that travel to the site of an infection. Once they reach the site of an infection, they ingest and fight potentially harmful germs.

Because your treatment will kill your stem cells, you'll temporarily lose your ability to make new neutrophils. Since your neutrophils aren't being replaced, the number of neutrophils in your bloodstream will drop to a very low level. This will put you at risk for serious, life-threatening infections. Infections that happen in people with impaired immune systems are called opportunistic infections.

To help keep you from getting an infection, you'll be started on prophylactic (PROH-fih-LAK-tik) medications. Prophylactic medications are given before there's an infection. You'll get medication to try to prevent bacterial infections (antibacterial), fungal infections (antifungal), and viruses (antiviral) early in your transplant journey. Even with these medications, you may still develop fevers in the first 2 weeks after transplant. Fever is an important sign of infection. If you develop a fever during transplant, your transplant team will do tests, such as blood and urine tests, to look for infection. X-rays or other radiology tests may also be done. You'll be given stronger antibiotics through your tunneled catheter to help fight the infection. Most infections are treated effectively with antibiotics.

Avoiding sources of infection

During the transplant process, it's critical to avoid possible sources of infection. This is easier said than done. You and your caregiver will need to be careful about seeing visitors, what you touch, and where you go. While your white blood cell count is low, you should try to avoid:

- Shaking hands. If you shake hands with someone, use an alcohol-based hand sanitizer, like Purell®, afterward.
- Contact with animals, including your pets. Pets can't stay with you during your transplant.
- Anyone who has signs of illness (such as cough, rash, fever, diarrhea) or who may have been exposed to a contagious disease.
- Contact with soil or dirt. Don't keep any plants in your room.

All visitors should be able to follow infection control precautions, including washing their hands, wearing a mask, and reporting symptoms of an illness. We consider age 10 to be the youngest age able to reliably follow these requirements.

You and your caregiver need to watch for visitors that have any signs of illness and ask them not to visit. We know it's hard to tell friends and family not to visit. We recommend using an app or programs like Skype™, Google Hangouts, or FaceTime to keep in touch with friends and family when you're neutropenic.

Following a food safe diet

When you have a low white blood cell count, you'll need to follow a food safe diet. This diet helps lower the risk of getting sick from food-borne illnesses.

A food safe diet contains fewer microbes (also called microorganisms) than what are usually found in food. Microbes are tiny living organisms, such as bacteria, viruses, and fungi (such as yeast and molds). Microbes attach to food and grow, but they often can't be seen, smelled, or tasted. They can grow on any type of food but are more likely to grow on dairy products, food that isn't refrigerated, undercooked food, certain fruits and vegetables, unpasteurized juices, and vegetable sprouts.

To lower your risk of getting an infection from foods:

- Eat only foods that you know have been stored properly and are safe to eat.
- Store food safely.
- Handle food safely.
- Eat only food that you know has been prepared and cooked following food safe diet guidelines.

Read the resource *Eating Well After Your Stem Cell Transplant*. You can find it in the "Educational Resources" section of this guide. Follow the guidelines very carefully when you or your caregiver is buying, handling, preparing, and cooking food. Also remember to clean your hands before meals and after using the bathroom.

Showering and bathing

While you're neutropenic (have neutropenia), it's very important to keep yourself clean.

Shower or bathe every day using a 4% chlorhexidine gluconate (CHG) solution antiseptic skin cleanser, such as Hibiclens®. 4% CHG solution is a fast-acting antiseptic that kills germs that live on your skin. It can work for up to 24 hours after you use it. Showering with 4% CHG solution will lower your risk of infection.

To use 4% CHG solution:

1. Use your normal shampoo to wash your hair. Rinse your head well.
2. Use your normal soap to wash your face and genital area. Rinse your body well with arm water.

3. Open the 4% CHG solution bottle. Pour some into your hand or a clean washcloth.
4. Move away from the shower stream. Rub the 4% CHG solution gently over your body from your neck to your feet. Don't put it on your face or genital area.
5. Move back into the shower stream to rinse off the 4% CHG solution. Use warm water.
6. Dry yourself off with a clean towel.
7. Don't put on any lotion, cream, deodorant, makeup, powder, or perfume.

When you're using 4% CHG solution:

- Don't put it on your head, face, eyes, ears, mouth, genital area, or on deep wounds. If you have a wound and aren't sure if you should use 4% CHG solution on it, ask a member of your transplant team.
- Don't use regular soap, lotion, cream, powder, or deodorant after washing with 4% CHG solution.
- If you have an irritation or allergic reaction when using 4% CHG solution, stop using it and call your doctor.

Caring for your mouth

While you're neutropenic, you'll need to change the way you brush your teeth and care for your mouth. This will help you avoid infection and bleeding. Follow these guidelines to take good care of your mouth:

- You'll be given a mouthwash to rinse your mouth before meals, after meals, and at bedtime. The number of rinses may be increased to every 2 hours, depending on how your mouth feels. Only use the mouthwash that your nurse gives you. Most store-bought mouthwashes contain alcohol, which can irritate and dry your mouth and throat.
- Use an ultra soft toothbrush.
- You can use toothpaste that you buy in the store.
- Don't use dental floss.
- Avoid licking your lips. Licking your lips makes them more chapped and dry.
- Apply a lip balm (such as Burt's Bees®, ChapStick, or A&D® ointment) after you clean or rinse your mouth and every 2 to 4 hours as needed. This will help keep your lips moist.
- Your doctor may prescribe an oral antifungal antibiotic to keep you from getting an infection in your mouth. Use it as instructed.

- If your mouth becomes sensitive, avoid hot, spicy, acidic, or coarse foods. You may prefer soft or liquid food served cold or at room temperature.
- If you have a lot of pain from mouth sores, your healthcare provider will give you pain medication.

Low red blood cell count (anemia)

Your red blood cells carry oxygen from your lungs to the tissues in all parts of your body. When you're anemic (have anemia), your blood can't carry oxygen as well. Some of the side effects of anemia include:

- Fatigue (feeling more tired than usual)
- Weakness
- Fast heartbeat
- Shortness of breath
- Headache
- Pale skin

If you have anemia, your doctor may prescribe a blood transfusion.

Low platelet count (thrombocytopenia)

Platelets are the cells that clump together to form a clot to help stop bleeding. After conditioning, the number of platelets in your blood will drop. This condition is called thrombocytopenia and increases your risk for bleeding. The most common areas of bleeding are your nose, mouth, skin, and gastrointestinal (GI) tract. You'll get a platelet transfusion if your platelet counts drop below 10,000 or if you're bleeding.

You'll need to take these special precautions if your platelets become very low:

- Avoid sharp objects, such as razors, scissors, and nail clippers. Only shave using an electric razor or shaver. Don't use a razor that has a blade.
- Don't have manicures, pedicures, waxes, electrolysis, or tattoos.
- Don't have any dental work done.
- Follow the guidelines in the "Caring for Your Mouth" section.
- Don't use rectal suppositories, enemas, or tampons.
- Don't take your temperature in your rectum.
- If you're straining to have bowel movements (poop), ask someone from your transplant team for a stool softener or laxative.
- Avoid tight clothing or any clothing that you have to strain to put on or take off.

You should also avoid any activities that may result in injury. These include:

- Contact sports
- Climbing ladders
- Strenuous exercise
- Bicycling
- Weight lifting

Some medications make it more difficult for your blood to clot and are very dangerous for anyone with a limited ability to clot and heal. Only take medications prescribed by your medical team. Don't take:

- Aspirin or products that contain aspirin
- Nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Advil®)
- Vitamin E



Always tell your transplant team if you have any bleeding. Call your doctor if you develop any symptoms of bleeding, such as:

- Easy bruising
- Faint, tiny, pin-point red dots on your torso, arms, or legs
- Vaginal spotting or heavy menstrual bleeding
- Broken blood vessels in the whites of your eyes
- Blood in your urine (pee)
- Headache that doesn't get better, blurred vision, or dizziness
- Coughing up blood, vomiting blood, or a nosebleed that doesn't stop after a few minutes with applied pressure or ice
- Black stool or blood in your stool

Nausea and vomiting

Nausea and vomiting are common side effects of treatment. Chemotherapy acts on a part of your brain that may trigger nausea and vomiting. Nausea and vomiting can also be caused by stress or just the thought of having chemotherapy. The amount of nausea and vomiting you have depends on the type of chemotherapy you get. You may have nausea during your conditioning, or it may be delayed for several hours or days.

You'll be given medication to prevent and control nausea before your conditioning. These medications work differently for each person. If the medication you're taking isn't helping, tell your transplant team or doctor. You may need to try a different medication or take more

than one kind of anti-nausea medication to feel better. Your transplant team will work with you to prevent and treat nausea and vomiting.

Diarrhea

Diarrhea is frequent, loose, watery bowel movements. It can also cause stomach cramps, gas, and pain in your abdomen (belly) or rectal area. Diarrhea can be caused by cancer treatments, medications, infection, stress, or other medical conditions. If you're having diarrhea, you can become dehydrated due to loss of fluids and electrolytes.

If you have diarrhea for more than 24 hours, call your transplant team. Medications are available to treat diarrhea, but don't take any over-the-counter medication until you have been evaluated by your transplant team.

Constipation

Constipation is having hard, dry bowel movements or having fewer bowel movements than usual. It happens when materials move too slowly through your large intestine. The normal length of time between bowel movements is different for everyone. If you're having fewer bowel movements than usual or if you haven't had a bowel movement for more than 2 days, you may be constipated.

There are many causes of constipation, including not drinking enough liquids or not eating enough fiber, a decrease in your activity, not moving around or walking enough, and side effects of chemotherapy, anti-nausea medications, and pain medications.

Medications are available to treat constipation. Tell your nurse or medical team if you haven't had a bowel movement for more than 2 days.

Mouth sores (mucositis)

Conditioning kills the cells that line your mouth and digestive tract, resulting in irritation. This is known as mucositis. Mucositis can cause redness, swelling, tenderness, and sores on the lining of your mouth, tongue, and lips. You may have some mouth and throat discomfort that can make it hard to eat or swallow. Tell your nurse if you're having any of these symptoms so they can be treated.

Hair loss

The chemotherapy that kills cancer cells also kills the cells that make your hair. Most people lose their hair during their transplant.

Losing your hair can be an unpleasant and upsetting experience. Many people choose to cut their hair short before their transplant to take control of this process and to lessen the shock of losing their hair. Talk this through with your caregiver, friends, and family.

Before your transplant is also a good time to think about whether you would like to wear a wig. Modern wigs can look very natural and wearing one may make you feel more comfortable. A list of wig stores in New York is included in the resource *Hair Loss and Your Cancer Treatment*. You can find it in the “Educational Resources” section of this guide.

You can get a wig while you still have your hair or bring a clipping of your hair if you’d like your wig to match your natural hair color. Ask your doctor for a prescription for the wig, as some insurance companies will reimburse some of the cost of a wig.

Skin changes

Conditioning can cause skin changes such as increased dryness, flaking, discoloration, and darkening. When you bathe, use a body soap that’s labeled for “sensitive skin.” Discuss the use of products with your nurse. Use alcohol-free lotions, creams, or oils to help relieve the dryness.

Your skin may also be very sensitive to the sun and may burn very easily. Avoid bright sunlight. When you’re outside, wear a sunscreen with an SPF of at least 30 and protective clothing, such as long-sleeved shirts, long pants, and a hat. Skin is the most common site for cancer, and sun protection reduces the risk of skin cancers.

Your nurse will tell you how to manage skin reactions during your treatment. For more information, read the resource *Skin Care Guidelines While You Are Receiving Radiation Therapy*. You can find it online at www.msccc.org/pe/skin_care_radiation_therapy or ask a member of your transplant team for a copy.

Rest Day

Some conditioning regimens include a rest day between your chemotherapy and your transplant day. This rest day allows time for the chemotherapy to work and then leave your body. This is so there will be no trace of chemotherapy left in your body to harm the newly transplanted stem cells.

Some conditioning regimens don’t have a rest day. This will be reviewed with you by your clinical nurse coordinator and noted on the calendar you’re given before your admission.

Transplant Day

After you finish your conditioning regimen, you’ll get your stem cell infusion—your transplant.

On Day 0 (transplant day), the stem cells that were collected and stored before transplant will be reinfused into your bloodstream through your tunneled catheter. The stem cells will be pushed from a large syringe or transfused from a bag, like a blood transfusion. This will take

place at the bedside (while you're in your hospital bed). After they're infused, the stem cells will travel to your bone marrow and make new blood cells.

Your stem cell infusion

- You'll be given medications about 30 minutes before your transplant to help reduce side effects that you may have during the infusion.
- Your stem cells will be brought to the bedside.
- Your stem cells will be infused through your tunneled catheter. You'll be closely monitored and your vital signs will be checked often during and after the infusion.
- You may have some side effects during and after your infusion. Common side effects are nausea, vomiting, a tickle in your throat, or a cough. Other less common side effects that can happen include fever, chills, and low blood pressure.

It's important that you communicate with your transplant team and caregiver during your transplant. Let your transplant team know how you're feeling and tell them if you have any side effects. If you do have side effects, your transplant team will treat them.

During and after your transplant, you may notice a strong, garlic-like taste in your mouth. Your urine, sweat, and skin may also have a garlic-like smell. You may not notice the smell, but those around you will. This smell is caused by the preservative used to store your stem cells and will gradually go away over 1 to 2 days. The Nutrition Department will give you lemons to cut up and use as safe, natural air fresheners.

Your urine may look discolored, ranging from pink-tinged to bloody. This can last for 24 hours after your stem cells are infused. This color change is caused by your body getting rid of extra red blood cells that may be with the stem cell infusion but aren't needed.

Phase 2: Transplant Day to Engraftment

Once you've had your transplant, you'll enter a period of watching and waiting until your blood counts recover (called engraftment). During this waiting period, your old blood cells will die and your blood counts will drop to their lowest levels. At some point, usually around day +5, your immune system won't work at all until engraftment. During this time you'll be at very high risk of getting an infection. You'll need to avoid sources of infection by cleaning your hands regularly and following a food safe diet. In addition to infections, other potential complications during this waiting period include anemia, bleeding, and continued or new side effects from conditioning. The management of these side effects is as described in the "Phase 1: Conditioning" section.

Here's a list of things that will happen during this phase:

- **You'll have testing.** You'll have blood tests and other tests as needed to monitor your progress. You'll have blood drawn every day.
- **You may continue to have side effects from the conditioning.** You'll be given medication to help manage the side effects and make you more comfortable.
- **You'll follow a food safe diet.** Because you're neutropenic, you'll follow a diet that contains a low number of potentially harmful microbes.
- **You may get transfusions.** You may need to get a blood transfusion to boost the numbers of red blood cells and platelets in your bloodstream.
- **Your blood counts will start to recover.** Over time, as the stem cells engraft and start to make new blood cells, your blood counts will get higher.
- **You'll stay physically active.** You'll try to remain physically active after your transplant by limiting the amount of time you spend in bed and walking a little each day. Follow the recommendations that your physical therapist gives you.

Risk of Infection

You'll be at risk for bacterial, fungal, and viral infections for several months after your transplant. They're a major risk in the early recovery period until your new bone marrow grows and makes white blood cells to fight infection. You'll still be at risk for some infections while your immune system recovers during the first year after your transplant.

Fever is one important sign of infection. If you develop a fever, you'll have blood and urine tests to check for infection. You may also have X-rays or other radiology studies. You'll be given strong IV antibiotics to help your body fight the infection. Nearly everyone will develop fever during the first 2 weeks after their transplant. Most infections are treated successfully with antibiotics.

Your doctors and nurses will try to keep you from getting infections. You'll likely be given medications that are used to treat infections, which can help prevent infections in people who have had a transplant. You'll get antiviral medications to help prevent some viral infections you may have had in the past from coming back after your transplant. These viral infections can include cold sores, recurrence of genital herpes, and shingles. You'll also get antifungal medication to prevent fungal infection.

People whose immune systems aren't working well can get infections that wouldn't happen in healthy people. These are called opportunistic infections. You may need medication to help protect you from these infections. You'll be at risk for them until your white blood cell count and immune system return to normal.

Bleeding

Your platelet count will be low. Since platelets form blood clots, you'll be at risk for bleeding. The mucous membranes of your nose, mouth, skin, and gastrointestinal (GI) tract are most commonly affected. You'll have platelet transfusions if your count falls below 10,000 or if you have any bleeding, or if they're needed for another reason (such as having an invasive procedure).

Anemia

When your red blood cell count is low, you might have weakness and fatigue. Your nurse will help you with your daily activities if you need help. You'll be given red blood cell transfusions as needed. These and all other blood products will be irradiated (exposed to radiation) to prevent harmful side effects.

Phase 3: Engraftment to Day of Discharge

Engraftment

After your stem cells are infused into your bloodstream, they travel to and enter the bone marrow. Once they're there, they start to divide and create healthy new blood cells. This process is called engraftment. Engraftment usually takes about 10 to 14 days, but it's different depending on your disease and treatment. As engraftment happens, the number of white blood cells, red blood cells, and platelets in your blood will increase. Red blood cells and platelets usually take a little longer to recover than white blood cells.

During engraftment, you may have bone pain, a rash, and fevers. These are common, and we can usually take care of them easily. Once your transplant team decides that your symptoms are well-controlled or gone, you'll be discharged and resume care with your primary BMT attending doctor in clinic.

Before Going Home

It's important for you to take part in planning your care after discharge. Your transplant team will work with you before you go home to make plans for your follow-up care.

Medical alert jewelry

Before you leave the hospital, you'll need to order a medical alert bracelet or necklace. Your transplant team will help you. Examples of medical alert jewelry companies include MedicAlert® (www.medicalert.org) and ROAD iD (www.roadid.com).

Your bracelet or necklace should be engraved with the statements “**Autologous stem cell transplant**” and “**Irradiated cellular blood components and CMV-safe blood components only.**” This will let paramedics or hospital staff know what to do if you’re in an accident and can’t tell them yourself.

Leaving the Hospital

Even though you may be very happy and feel ready to be discharged, you might also feel nervous. It’s normal to have some worries and concerns as you get closer to your discharge. After you leave, you and your family will need to manage your care. Feeling confident and comfortable doing this takes time. During your follow-up visits, your social worker can help you get the services you need and give you emotional support.

After you’re discharged, it’ll take time to get used to living at home again. You may find that the things you need to do to keep from getting sick add some stress to your life. Feeling a sense of balance and comfort again will come with time. Try to stay as calm and confident as you can.

Your recovery after transplant will be gradual. You probably won’t feel the way you did before your illness for a while. You may feel tired and weak, have a smaller appetite, and notice changes in the way things taste and smell. It’ll also take time for you to get your strength back and go back to doing the activities you enjoyed before your illness and transplant.

Phase 4: Early Convalescence

This phase of your recovery extends over a long period of time—from discharge to 1 year after your transplant or longer. It’s important to remember that, even though your blood counts are coming back up to the normal range, your immune system is still very immature. You’ll still need to take medications and follow precautions to keep yourself healthy and avoid infection.

The time frames given here are general guidelines. Your transplant team may give you a more exact time frame.

Preventing Infection

It usually takes 3 to 12 months for your immune system to recover from your transplant. The first year after transplant is like your first year of life as a newborn baby. During this time, you’re at risk for infection. Your transplant team will check your blood cell counts to see how well your immune system is working. Depending on your blood cell counts, they may make changes or additions to the guidelines below.

Here are a few general tips to keep from getting an infection:

- Wash your hands often with antibacterial soap and water or an alcohol-based hand sanitizer.
- Stay away from people who are sick or have recently been sick.
- Wear a mask while you're in public or if you may be near strangers (if your transplant team asks you to).

The following things can be a sign of infection. Call your doctor's office right away if you have:

- A fever of 100.4 °F (38.0 °C) or higher.
 - **Don't take acetaminophen (Tylenol®) unless your healthcare provider tells you to.**
 - You don't have to take your temperature every day. But, check it regularly if you don't feel well.
- Flushed (red, warm-feeling) skin, sweating, or shaking chills.
- Coughing, sneezing, runny nose, shortness of breath, or chest discomfort.
- Redness, swelling, or pain in your throat, eyes, ears, skin, joints, or abdomen.
- Blurred vision or other changes in your ability to see clearly.
- Frequent urination (peeing), a burning feeling when you urinate, or both.
- Irritation in your rectum, including burning and pain.
- A rash.
- Small blisters, similar to cold sores, around your mouth or on any other parts of your body.
- Trouble flushing your tunneled chest catheter, if you have one.
- Chills while or after flushing your tunneled chest catheter, if you have one.

You can catch viruses more easily until your immune system is back to normal. One of these is the virus that causes chickenpox and shingles. If you're exposed to chickenpox or shingles, call your transplant doctor or nurse right away. You'll need to come in so they can see if you need treatment.

It's also possible for viruses that you've had in the past to reactivate. For example, the virus that causes chickenpox and shingles can reactivate if you had chickenpox as a child. This often starts as pain in your skin with pimples or fluid-filled blisters. If you develop blisters,

they can be tiny or as large as a pencil eraser. They may be painful, itch, or burn. If you have any of these symptoms, call your doctor or nurse right away so you can be treated.

Once your immune system has recovered, you'll start getting your childhood vaccines. This usually starts about 1 year after your transplant, but your transplant team will decide when the timing is right for you. Read the "Phase 5: Late Convalescence" section for more information.

There are certain things you can do to lower your chance of getting an infection. Below, we give some guidelines for you to follow. Your transplant team may give you more instructions or changes to the guidelines below. Always follow your transplant team's instructions.

Personal hygiene

While you're recovering from your transplant, it's very important to keep yourself clean. Doing this can help prevent infection. Follow the guidelines below.

- Shower or bathe every day.
 - Use a mild soap, such as Dove® or Caress®. Don't use Ivory® or a deodorant soap. They can dry out your skin.
 - Be sure to wash your underarms and groin.
 - Use a washcloth and towel that are only for your personal use.
 - If your skin is dry, don't use very hot water. Apply baby oil or a skin moisturizer, such as Eucerin® or CeraVe®. Put it on after you bathe, while your skin is still damp. Gently pat your skin dry with your towel. Don't use lotions containing alcohol. They'll make your skin more dry.
- Limit your time in direct sunlight.
 - Your skin will be more sensitive and may burn more easily after your transplant. The medications you're taking may add to this. Whenever you're in the sun, protect your skin with a sunblock that has an SPF of at least 30. Reapply it often.
 - If you'll be in direct sunlight for 20 minutes or longer, cover your skin with cotton clothing and a protective hat. Being in the sun for a long time may also reactivate cold sores (herpes simplex virus).
- You can wear contact lenses, but make sure that they're cleaned well before you put them in. Don't reuse cleaning solution. Be sure to throw cleaning solutions away when they expire. If your eyes are dry, use moisturizing drops.
- You can wear makeup, but buy all new products after your transplant.

- New nails will grow and replace your old nails. This will happen gradually over 3 to 4 months after your transplant. Don't get a manicure or pedicure in a nail salon while your immune system is still recovering. You can do this at home with your own equipment.
- If you still have a tunneled catheter, don't let it soak in water while you bathe. Read the resource *About Your Tunneled Catheter* for more information.
- Don't get body piercings or tattoos after your transplant. These increase your risk of hepatitis and other infections.

Hair usually starts to grow back about 3 months after the transplant. It's possible that your hair may grow back with a different texture. Although it's rare, hair loss can happen months or years after your transplant.

Mouth care

Keep following the instructions in the "Caring for Your Mouth" section until your transplant team tells you that you can start using an ultra soft toothbrush. You can brush your teeth with an ultra soft toothbrush if:

- Your absolute neutrophil count (ANC) is higher than 500 (sometimes called 0.5).
- Your platelet count is 20,000 (sometimes called 20) or higher.

Ask your doctor or dentist when you can floss and brush your teeth with a regular toothbrush.

If you wear dentures, keep them clean to prevent an infection. Soak them every day in any type of denture cleaner. Use the directions on the product. Then, rinse them well with tap water. Your dentures may need refitting after your transplant.

If any of your medications are mouth rinses, take out your dentures before rinsing or swishing the medication. This will help the medications work better and will keep your mouth from becoming reinfected. Tell your doctor or nurse if you have pain or discomfort in your mouth.

You may have mouth dryness for 3 to 4 months or longer after your transplant. Don't use store-bought, alcohol-based mouthwashes or hydrogen peroxide. They'll dry and irritate your mouth. Instead, use a mild saltwater rinse. Make it by mixing ½ teaspoon of salt and ½ teaspoon of baking soda in an 8-ounce glass of water. Your dentist may prescribe other rinses. Sucking on sugarless candy or lozenges may also help.

Your salivary glands may not be as good at washing bacteria from your mouth after your transplant. This increases your risk of cavities. Use toothpaste with fluoride. You can also use a mouthwash with fluoride once your mouth has fully recovered and is no longer too dry. Follow the instructions on the mouthwash bottle.

Caring for Your Tunneled Catheter

It's just as important to keep your tunneled catheter clean after you go home as it was while you were in the hospital. If you go home with a tunneled catheter, your nurse will teach you how to care for it at home. You'll have a chance to practice with your nurse watching. Read the resource *About Your Tunneled Catheter* for more information.

Your Home Environment

Keep your home as free of dirt and dust as possible. But, you shouldn't go to extremes. Don't repaint your walls or put down new carpets. In fact, you shouldn't be around any renovations or construction until your transplant team tells you it's okay. This includes those in process and those done within the past 3 months.

Stay out of musty areas where mold might grow, such as a damp basement. You can use an air filtration system in your home, but you don't need to.

Don't use a humidifier. Bacteria and mold grow easily in it. A pan of water placed near a heat source may help in the winter. **Change the water every day.**

In general, try not to do any chores like dusting or vacuuming for the first 3 months after your transplant. Depending on your energy level, it's fine for you to cook, wash dishes, or iron. Keep your bathroom very clean, especially the tub and toilet. Use a disinfectant regularly. It's best for someone else to do this.

Wash your eating utensils, towels, and linens carefully. They don't need to be washed separately from the rest of your household.

- Thoroughly wash all forks, spoons, and knives with hot water and dishwashing detergent or use a dishwasher.
- Wash towels twice a week and bed linens once a week. Use only your own towels and washcloths, not those of your family members.

You can have plants in your home. But, for the first few months after your transplant:

- Don't touch the soil from household plants unless you wear gloves and a mask.
- Don't touch the water in a vase of flowers. Someone else should change the water in the vases daily.

Pets and animals

Animals can carry diseases. They may put you at greater risk for infection while your immune system is recovering. You can have a pet in your home and touch it, but it's best that

you don't have close physical contact. For example, don't hold the animal in your lap. Don't touch the animal's saliva or feces. Be sure to protect yourself from bites or scratches.

Don't handle or care for birds, lizards, snakes, turtles, hamsters, or other rodents while you're recovering. If you have an aquarium and you have to clean it yourself, protect yourself by wearing gloves.

If you have a cat or dog at home, follow the additional guidelines below until your doctor gives you other instructions.

- Be sure that your pet is up-to-date with immunizations and any booster shots.
- Have your pet's veterinarian check their stool for parasites every year.
- If you have a cat, get it tested for feline leukemia and toxoplasmosis every year.
- Have your pet treated for fleas. If your pet walks through wooded areas, have it screened for ticks every day during tick season (May to November). Talk with your pet's veterinarian about using a flea and tick collar.
- Don't clean cat litter boxes or clean up after your dog. Have someone else do these things for you.
- Keep your pets indoors or on your own property whenever you can. This is to help keep them from getting diseases from other animals.
- Don't let pets in your bed.

If you plan to get a pet after your transplant, it's best that you choose a healthy dog or cat that's more than 1 year old. Have it spayed or neutered. Outside of your home, avoid close contact with animals in a farm or a petting zoo.

Family and visitors

You can have close physical contact with people in your immediate family. But, don't have close contact with someone who has a cold or any signs of being sick. Wear a mask if you must be in the same room with someone who's sick. Your family members and close friends should get a yearly flu shot.

You can have visitors, but limit them to small groups. Don't visit with anyone who has:

- A cold.
- Chickenpox.
- Recently been exposed to chickenpox.
- Recently been exposed to herpes, shingles, or any other type of virus or infection.

- Recently got a vaccine with a live virus (such as varicella or rotavirus). There are very few of these, but if someone in your household needs one, their doctor should be told that you're immune suppressed and live in the same household.



Call your doctor right away if you or a family member is exposed to chickenpox, shingles, measles, or German measles (rubella).

Outside Your Home

Walking is an excellent way to regain your strength and endurance. Take regular walks outside, but avoid dirty areas and construction sites. During the first few months after your transplant, avoid the following places when they're crowded:

- Supermarkets
- Shopping malls
- Movie theaters
- Schools
- Restaurants
- Public transportation
- Places of worship (such as churches or synagogues)

You can go to these places at off-peak hours when there are fewer people.

Avoid taking public transportation (such as a train or bus) for at least 3 months after your transplant. We understand you may need to take a taxi, car service, or other transportation (such as Access-a-Ride) to return for follow-up visits. We recommended that you wear a mask when traveling by this means.

You can swim in the ocean after you regain your strength and are more active. Pay attention to alerts from the local health department. You can also swim in a private pool that isn't crowded. Make sure the pool is chlorinated.

Don't swim in lakes, rivers, or crowded pools until your immune system has recovered.

Don't swim if your tunneled catheter is still in place.

Bleeding

Platelets are blood cells that help form clots and control bleeding. When your platelet count is low, you're at risk for bleeding. Many people are discharged with a low platelet count. It can take weeks or months for your body to make enough platelets so your count returns to normal. You may need to have platelet transfusions.

Signs of a low platelet count include skin changes, bleeding, or both. Skin changes may include a lot of bruising or petechiae (peh-TEE-kee-ee). These are tiny, purplish-red spots on the skin that don't disappear when you press them. You may see them on your lower legs or inside ankles. If you see many petechiae, call your doctor. Other symptoms of a low-platelet count may include bleeding from your gums or nose.

If you're discharged with any of these symptoms and they increase in amount or frequency, call your doctor. If you haven't had any of these symptoms and suddenly develop them, call your doctor. It may mean that there's a change in your platelet count.

If you have an injury that causes bleeding, don't panic. Stay calm and follow the guidelines below for the type of injury.

- **Open wounds:** If you cut yourself, put a clean, dry gauze pad, towel, or cloth over the cut. Press firmly. Keep pressing to apply pressure until the bleeding stops. If the bleeding doesn't stop, elevate the wound. For example, raise your arm or prop up your feet. Apply ice to the wound and call your doctor.
- **Nosebleeds:** If you have a nosebleed, sit up and lean forward slightly. Don't tilt your head back. Squeeze the bridge of your nose firmly between your thumb and forefinger for at least 10 minutes without letting go. If the bleeding doesn't stop, keep squeezing your nose. Apply a small bag of ice to the bridge of your nose until the bleeding stops. If the bleeding continues longer than 30 minutes, call your doctor.
- **Accidents:** If you're in an accident, you may need blood or blood products. They should be irradiated to 3,000 rads. This is to keep transfused blood from causing GVHD.
 - Wear your medical alert jewelry at all times. It gives the doctor who will be treating you this information. Read the "Medical alert jewelry" section for information about what to write on your medical alert jewelry.
 - If you're admitted to another hospital, have the doctor call MSK right away for guidelines on blood products.

If your platelet count is below 50,000 (50), follow the guidelines below.

- Use an electric razor when shaving.
- Use a soft-bristle toothbrush or an oral irrigator (such as a WaterPic®) to prevent gum bleeding. Don't use dental floss.
- Don't take aspirin, products that have aspirin, or aspirin-like medications, such as such as ibuprofen (Advil®) or naproxen (Aleve®). For more information, read the section "Common Medications to Avoid."
- Avoid blowing your nose forcefully.

- If you're constipated, call your doctor. You may need more fiber in your diet or a stool softener.
- Avoid activities or sports that can cause injury. If you have any questions or concerns about this, talk with your doctor.

Resuming Your Activities

Daily activities

The time it takes to recover after a transplant varies. Most people find that it takes about 3 months, while others may need more or less time.

The time after your transplant is a time of cell recovery and growth. The cells in your mouth, stomach, intestine, hair, and muscles will all regrow. This requires calories and energy. You may feel more tired than you expected. Remember, this fatigue and weakness are normal. Each week, you should get more of your strength back.

Around the 3rd month after your transplant, your hair will start growing more quickly. You may feel well enough to start going back to your usual level of activity. From this point on, you'll probably feel better and better. For most people, however, the first 2 to 3 months to 1 year after transplant remain a time of recovery.

Exercise

Most people find it takes time to regain their strength. It may be helpful to follow a regular exercise plan. When you start to exercise, start with easy exercises. Your physical therapist can help you decide what type of exercise is right for you. As you feel ready, ask your doctor how to increase your exercise.

Don't play contact sports or ski until your platelet count is over 100,000.

Hobbies

Some hobbies, such as woodworking, painting, and model building, use products that can be toxic. Always work in a room with plenty of fresh air. Keep the windows open. Use nontoxic paints and glue. If you have questions or concerns about resuming any of your hobbies, ask your doctor.

Returning to school or work

The earliest you can go back to school or work is about 4 months from the time of your transplant. This time frame can vary from person to person and depends many things. Some people may feel ready to return right away, while others feel worried after being away for so long. It may help to start slowly. For example, start with a schedule of half days or 3 days a

week. Most people tell us that thinking about returning is almost harder than actually doing it.

Making the transition back to your usual lifestyle can be hard. Some people have talked about feelings related to changes in their appearance, such as hair loss. Others have trouble concentrating or maintaining their attention span. Many can't keep up their former pace. Your transplant team is here to talk with you about going back to school or work. You can talk to a social worker, nurse, psychiatrist, or your doctor. We can work with you to find ways to make your transition easier.

Traveling

For the first 100 days after the day of your transplant, avoid traveling more than about 1 hour away from MSK.

If you plan to travel by plane, talk with your transplant team. You must have a high enough platelet count to safely travel by plane.

If you plan to travel out of the country during the first 2 years after your transplant, talk with your transplant team. They may recommend that you see an expert in travel medicine to reduce your risk of infection while abroad, depending on your destination.

Sexual health

Before you go home, ask your doctor when it's safe for you to have sexual activity. It's important for you and your partner to have answers to your questions. If new questions come up, you can discuss them during your follow-up visits.

Protecting yourself during sexual activity

Until your doctor tells you that your blood counts and immune system have recovered:

- When your platelet counts are low (less than 50,000)
 - Avoid sex that involves penetration or contact with mucous membranes. This includes vaginal, oral, and anal sex, and inserting fingers, vibrators, or other sex toys into your vagina or anus. Hugging, cuddling, gentle touching, and kissing skin are other ways you can be intimate with your partner during this time.
- When your platelet count is above 50,000:
 - Use latex condoms each time you have vaginal, oral, or anal sex.
 - Use a barrier device (condoms or dental dams) any time your partner's vaginal secretions or semen could enter your mouth.
 - Don't have any sexual activity that could expose your mouth to feces.

- Avoid sex that involves contact with mucous membranes if a genital infection is suspected or present in either you or your partner.

For more information about being sexually active during and after treatment, talk with a member of your transplant team, or ask for the following resources:

- You can find the following resources on our website.
 - *Sex and Your Cancer Treatment*
www.mskcc.org/pe/sex_cancer_treatment
 - *Sexual Health and Intimacy*
www.mskcc.org/pe/sexual_health_intimacy
- The American Cancer Society publishes 2 resources about sexuality following cancer treatment. They're available for free from your local American Cancer Society or on their website at the links below.
 - *Sex and the Adult Male with Cancer*
www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-side-effects/sexuality-for-men-with-cancer.html
 - *Sex and the Adult Female with Cancer*
www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/fertility-and-sexual-side-effects/sexuality-for-women-with-cancer.html

Information for females

After your transplant, you may have:

- Fewer menstrual periods
- No menstrual periods
- Vaginal dryness and discomfort

Talk with your BMT doctor before using the products below.

Vaginal moisturizers are nonhormonal, over-the-counter products that help relieve vaginal dryness and discomfort. They're available in most drug stores or on the Internet. Examples are vitamin E liquid capsules, Replens®, Hyalo GYN®, and K-Y® Brand LIQUIBEADS™.

Vaginal lubricants usually come in a liquid or gel form. They're used to supplement a woman's own lubrication and minimize dryness and pain during sexual activity. Use these lubricants to make sexual intercourse more comfortable and pleasurable. Examples are Astroglide®, K-Y® Jelly, and Pjur® Woman Bodyglide (a silicone-based lubricant). For more information, read the resource *Improving Your Vulvovaginal Health*. You can find it online at www.mskcc.org/pe/improving_vulvovaginal_health or ask a member of your transplant team for a copy.

Depending on your treatment, the function of your ovaries may change. This can result in decreased estrogen levels. Your doctor may recommend that you take estrogen supplements after your transplant.

If you need any help or support with these issues, your doctor can refer you to a specialist in our Female Sexual Medicine and Women's Health Program. You can also contact the program by calling 646-888-5076.

Information for males

Some people experience decreased sexual desire after their transplant. As you regain your strength and increase your activities, however, this may also change.

Some people also experience erectile dysfunction (ED) after their transplant. ED can be treated with medication, including sildenafil citrate (Viagra®) or tadalafil (Cialis®). There are many other ways to treat ED. Your doctor can refer you to a specialist in our Male Sexual and Reproductive Medicine Program. You can also reach the clinic directly by calling 646-888-6024.

Drinking Alcohol and Using Tobacco

After your transplant, your organs need time to recover. Alcohol can harm your liver and recovering bone marrow. This harm can be worse if you're taking medications that can affect your liver. Don't drink alcohol until your doctor tells you it's safe.

Never smoke cigarettes, cigars, other tobacco products, or marijuana. Doing so can lead to a serious lung infection. It can also increase your risk of a second cancer. If you need help quitting, contact the MSK Tobacco Treatment Program at 212-610-0507 or go to www.mskcc.org/cancer-care/counseling-support/tobacco-treatment

Follow-Up Care

Your follow-up visits will be scheduled before you're discharged. In general, you'll be seen at least 1 to 2 times a week for the first 3 months after your transplant. After that, your appointments will be spaced further apart as long as you're doing well.

Before your visits, make a list of any medications that need to be refilled. If you're going to run out of any medications before your follow-up visit, tell your doctor before your appointment. You'll be given prescriptions during your visit to be filled either at MSK or your local pharmacy.

When you come to the clinic for your follow-up visits, always wear a surgical mask. Bring a list of all the medications you're taking and the dosages of each one. Some people find it helpful to bring a list of questions that have come up since the last visit.

You'll have blood tests to check your blood counts, electrolyte levels, and liver and kidney function. Bone marrow studies will be done according to your disease and treatment course.

Some diseases will require lumbar punctures (spinal taps) after transplant. A lumbar puncture lets your doctor give you more chemotherapy in your spinal fluid after your transplant. It can also be given through an Ommaya reservoir, if you have one.

You may need to have IV treatments such as antibiotics and blood transfusions. If you do, your doctor or nurse will tell you how long and how often you'll need them. These appointments will usually be scheduled at the same time as your follow-up visits.

At some point after your transplant, you might be referred to our BMT Survivorship clinic. There, you'll see a survivorship NP. A survivorship NP is part of your transplant team. They work closely with your doctors and nurses to help with your recovery. This NP will also communicate directly with your primary care provider so information about your transplant is included in your overall healthcare.

Dental Care

After you have recovered from your transplant, go to your local dentist for routine checks. If you need extensive dental work, ask your transplant doctor what you should do. They'll tell you when it's safe to resume all dental care with your dentist.

Tell your doctor or dentist if you have:

- Taken the medications pamidronate (Aredia®) or zoledronic acid (Zometa®)
- Jaw tightness
- Toothaches
- Discoloration at your gum line
- Receding gums

Common Medications to Avoid

Don't take aspirin, any medications containing aspirin, or nonsteroidal anti-inflammatory drugs (NSAIDs) until your doctor gives you other instructions. For a list of these medications, read the resource *Common Medications Containing Aspirin, Other Nonsteroidal Anti-inflammatory Drugs (NSAIDs), or Vitamin E*. You can find it online at www.mskcc.org/pe/common_meds or ask a member of your transplant team for a copy.

Check the label of any over-the-counter medications that you're thinking of taking to make sure they don't contain ingredients you should avoid. If you aren't sure if a medication is safe to take, ask your transplant team.

Don't take any herbal supplements or home remedies without talking to your transplant team first.

Phase 5: Late Convalescence

Relapse

Many people are worried that their cancer will come back. Your risk is higher if you had your transplant when you were in an advanced stage of disease or you weren't in remission. Your doctor will follow you closely to watch for any sign of relapse.

Continued Follow-Up Care

Immunizations

Having a transplant takes away all the immunity you got during your life before transplant. This includes the vaccines you received as a child. Because of this, you need to be re-vaccinated with childhood vaccines once your immune system has recovered. This usually happens about 1 year after transplant.

Once it's safe for you to receive vaccines, you'll be scheduled for them at MSK. This is because it may be difficult for your primary care doctor to get the vaccines. You'll get only "killed" vaccines first, and if you respond to those, you'll then get "partially killed" vaccines, such as for measles and shingles.

Eye exams

Vision changes, sometimes due to cataracts, are fairly common after transplant. See an eye doctor if you develop any of the following symptoms:

- Cloudy, blurry, foggy, or filmy vision
- Changes in the way you see color
- Problems driving at night, such as glare from oncoming headlights
- Problems with glare during the day
- Double vision

You might only need a change in your eyeglass or contact lens prescription. Be sure to tell your optician or eye doctor what treatment you had.

Try to wait until at least 3 months after your transplant before getting a new eyeglass or contact lens prescription. Your vision can change during the recovery process.

Educational Resources

This section contains the educational resources we referred to throughout this guide. You can find them online, or you can ask a member of your transplant team. You can also search for more educational materials on the Patient and Caregiver Education website, www.mskcc.org/pe.

About Bone Marrow Harvesting

www.mskcc.org/pe/bone_marrow_harvesting

About Your Blood Transfusion

www.mskcc.org/pe/blood_transfusion

About Your Tunneled Catheter

www.mskcc.org/pe/about_tunneled_catheter

Advance Care Planning

www.mskcc.org/pe/advance_care_planning

Autologous Peripheral Blood Stem Cell Harvesting

www.mskcc.org/pe/autologous_pbsc_harvesting

Building Your Family After Cancer Treatment: For People Born With Testicles

www.mskcc.org/pe/building_family_born_testicles

Call! Don't Fall!

www.mskcc.org/pe/call_dont_fall

Caregivers' Guide for Bone Marrow/Stem Cell Transplant

www.mskcc.org/pe/caregivers_guide_bmt

Common Medications Containing Aspirin, Other Nonsteroidal Anti-inflammatory Drugs (NSAIDs), or Vitamin E

www.mskcc.org/pe/common_meds

Communicating With Your Care Team: When to Call or Use MyMSK

www.mskcc.org/pe/communicating_using_mymsk

Fertility Preservation Before Cancer Treatment: Options for People Born with Ovaries and a Uterus

www.mskcc.org/pe/fertility_starting_treatment

Hair Loss and Your Cancer Treatment

www.mskcc.org/pe/hair_loss_cancer_treatment

Hand Hygiene and Preventing Infection

www.mskcc.org/pe/hand_hygiene

How to Give Yourself an Injection of Filgrastim (Neupogen®) or Pegfilgrastim (Neulasta®) Using a Prefilled Syringe

www.mskcc.org/pe/injection_filgrastim_pegfilgrastim

Improving Your Vulvovaginal Health

www.mskcc.org/pe/improving_vulvovaginal_health

Outpatient Cellular Therapy Emergency Guide

www.mskcc.org/pe/cellular_therapy_emergency_guide

Outpatient Cellular Therapy Temperature & Liquid Intake Log

www.mskcc.org/pe/cellular_therapy_log

Sex and Your Cancer Treatment

www.mskcc.org/pe/sex_cancer_treatment

Sexual Health and Intimacy

www.mskcc.org/pe/sexual_health_intimacy

Skin Care Guidelines While You Are Receiving Radiation Therapy

www.mskcc.org/pe/skin_care_radiation_therapy

Sperm Banking

www.mskcc.org/pe/sperm_banking



PATIENT & CAREGIVER EDUCATION

About Your Blood Transfusion

This information explains what to expect before, during, and after your blood transfusion. A blood transfusion is when blood or blood cells are put into your body. You may need a blood transfusion because of how your cancer or cancer treatment affects your blood.

Some people may not want a blood transfusion for religious or other reasons. It's always your right to refuse a treatment. Your healthcare provider will only recommend a blood transfusion if they think it's needed. You can lose lots of blood during some types of surgery. If this blood isn't replaced, you can die.

About Blood

Blood is made up of plasma, red blood cells, platelets, and white blood cells.

- Plasma is the liquid part of blood. It holds your blood cells. You may need a plasma transfusion if your blood isn't clotting well.
- Red blood cells carry oxygen to all parts of your body. You may need a transfusion of red blood cells if you have a low red blood cell count (anemia). This can help relieve dizziness, shortness of breath, or fatigue (feeling more tired or having less energy than usual).
- Platelets help form clots and stop bleeding. You may need a platelet transfusion if you have a low platelet count (thrombocytopenia). This can help stop bleeding or keep you from bleeding too much during a surgery or procedure.
- White blood cells fight infection. White blood cell transfusions are rare and are only done in very specific situations.

About Donated Blood

There are no blood substitutes currently available. The blood or blood cells you get during your transfusion are usually donated by another person.

Sometimes you can donate your own blood so it can be stored and given back to you if needed. This is called an autologous (aw-TAH-luh-gus) donation. For more information, read the resource *Being Your Own Blood Donor* (www.mskcc.org/pe/autologous_blood_donation).

After it's donated, blood is tested to see what type it is. It's also tested for things such as:

- Syphilis
- Hepatitis B and C
- HIV
- A virus linked to a very rare form of leukemia
- West Nile virus
- *Trypanosoma cruzi* (a parasite that causes Chagas disease)
- Zika virus
- Bacteria (platelets only)

If the tests show any of these, the blood is thrown away.

Directed donations

A directed donation is when someone donates blood or blood cells specifically for you. Directed donations are tested in the same way as other donations. If the blood tests positive for any of the things listed above, we'll notify the donor privately.

Directed red blood cell donations are held for you for 25 days. Directed platelet donations are held for you for 4 days. After that, the donation may be given to someone else. It will also be given to someone else if the donor's blood type isn't a match for yours.

Before Your Blood Transfusion

Before your transfusion, we'll check your blood type with a test called a type and screen. The blood bank may take 2 to 4 hours to process the test. It may take longer if you have unexpected results. Your healthcare provider will use the results of your type and screen to make sure the blood or blood cells you get during your transfusion are safe for you.

Your healthcare provide will also talk with you about risks associated with having a blood transfusion. There's a very small chance of having an allergic reaction during or after your transfusion. The most common reactions are a fever of 100.4 °F (38 °C), chills, or hives. These can be treated with medication. Transfusion reactions are rarely life-threatening.

During Your Blood Transfusion

When everything is ready, the nurse will access one of your veins.

- If you have a central venous catheter (CVC), such as a tunneled chest catheter or peripherally inserted central catheter (PICC line), the nurse will use it for your transfusion. Accessing your CVC won't hurt.
- If you have an implanted port, such as a Mediport®, the nurse will use it for your transfusion. This will be the same type of needle stick you have for chemotherapy.
- If you don't have an implanted port or CVC, the nurse will put an intravenous (IV) line into one of your veins.

After they access your vein, the nurse will start the transfusion. The transfusion won't hurt.

A transfusion of one unit of red blood cells usually takes 2 to 4 hours. A transfusion of one unit of platelets takes about 30 to 60 minutes. Your nurse will monitor you carefully during your entire transfusion.

After Your Blood Transfusion

If you got your blood transfusion through a vein in your arm or leg, you may have some bruising or irritation in the area where the needle was. If the bruising or irritation is bad, call your healthcare provider.

Blood transfusions can cause an allergic reaction up to 2 days after the transfusion. Call your healthcare provider if you have any of the reactions below.

When to Call Your Healthcare Provider

Call your healthcare provider if you have:

- A fever of 100.4 °F (38 °C) or higher
- Chills
- Redness and warmth in your face
- Hives, rash, or itching
- Trouble breathing or shortness of breath
- Lower back pain
- Nausea (feeling like you're going to throw up) or vomiting (throwing up)
- Weakness or fainting
- Dark-colored urine (pee)

If you have chest pain, call 911 right away.

If you have any questions, contact a member of your healthcare team directly. If you're a patient at MSK and you need to reach a provider after 5:00 PM, during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

About Your Blood Transfusion - Last updated on January 11, 2021

All rights owned and reserved by Memorial Sloan Kettering Cancer Center



PATIENT & CAREGIVER EDUCATION

About Your Tunneled Catheter

This information explains what a tunneled catheter is and how it's placed. It also has general guidelines for caring for your tunneled catheter at home. A tunneled catheter is a type of central venous catheter (CVC).

About tunneled catheters

A tunneled catheter is a flexible catheter (thin tube) that goes into a vein in your chest. There are many different types of tunneled catheters. Your doctor will decide which type is best for you.

All tunneled catheters are tunneled under your skin and into a large vein near your heart (see Figure 1).

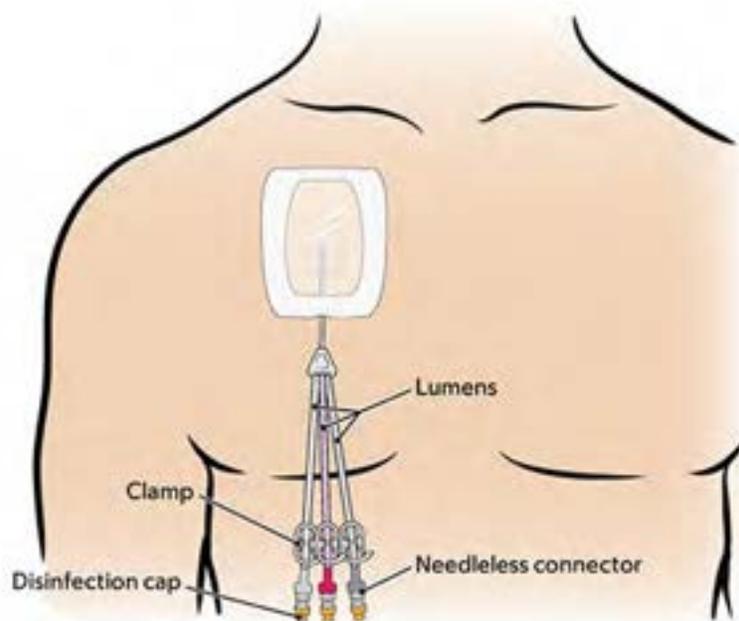


Figure 1. Tunneled catheter

The catheter splits into 1, 2, or 3 lumens (smaller tubes) outside of your body. Each lumen has:

- A clamp.
- A needleless connector (also called a clave).
- A disinfection cap on the end.

Having a tunneled catheter can help you need fewer needle sticks. It can be used to:

- Take blood samples.
- Give fluids.
- Give chemotherapy and other cancer treatments, such as CAR-T and bone marrow transplant.
- Give intravenous (IV) medications and nutrition.
- Give blood transfusions.

A tunneled catheter can stay in your body for weeks, months, or even years. Your doctor will remove it when you do not need it anymore.

You will have a procedure to place your tunneled catheter. Your nurse will tell you how to get ready for your procedure. They will also teach you how to care for your tunneled catheter after your procedure. It can be helpful to have a caregiver, family member, or friend learn with you.

Most people can do normal activities with a tunneled catheter, such as work, school, sexual activity, showering, and mild exercise. Talk with your doctor or nurse about which activities are safe to do before you start them.

Avoid contact sports, such as football and soccer. Avoid submerging your catheter in water, such as swimming in a pool or ocean, while your catheter is in place.

What to do before your procedure

Ask About Your Medications

You may need to stop taking some of your medications before your procedure. Talk with your healthcare provider about which medications are safe for you to stop taking. We've included some common examples below.

Blood thinners

Blood thinners are medications that affect the way your blood clots. If you take blood thinners, ask the healthcare provider performing your procedure what to do. They may recommend you stop taking the medication. This will depend on the type of procedure you're having and the reason you're taking blood thinners.

Examples of common blood thinners are listed below. There are others, so be sure your care team knows all the medications you take. **Do not stop taking your blood thinner without talking with a member of your care team.**

- Apixaban (Eliquis®)
- Aspirin
- Celecoxib (Celebrex®)
- Cilostazol (Pletal®)
- Clopidogrel (Plavix®)
- Dabigatran (Pradaxa®)
- Dalteparin (Fragmin®)
- Dipyridamole (Persantine®)
- Edoxaban (Savaysa®)
- Enoxaparin (Lovenox®)
- Fondaparinux (Arixtra®)
- Heparin (shot under your skin)
- Meloxicam (Mobic®)
- Nonsteroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen (Advil®, Motrin®) and naproxen (Aleve®)
- Pentoxifylline (Trental®)
- Prasugrel (Effient®)
- Rivaroxaban (Xarelto®)
- Sulfasalazine (Azulfidine®, Sulfazine®)
- Ticagrelor (Brilinta®)
- Tinzaparin (Innohep®)
- Warfarin (Jantoven®, Coumadin®)

Read *Common Medications Containing Aspirin, Other Nonsteroidal Anti-inflammatory Drugs (NSAIDs), or Vitamin E* (www.mskcc.org/pe/common_meds). It has information about medications you'll need to avoid before your procedure.

Medications for diabetes

Before your procedure, talk with the healthcare provider who prescribes your insulin or other medications for diabetes. They may need to change the dose of the medications you take for diabetes. Ask them what you should do the morning of your procedure.

Your care team will check your blood sugar levels during your procedure.

Diuretics (water pills)

A diuretic is a medication that makes you urinate (pee) more often. Hydrochlorothiazide (Microzide®) and furosemide (Lasix®) are common diuretics.

If you take any diuretics, ask the healthcare provider doing your procedure what to do. You may need to stop taking them the day of your procedure.

Take devices off your skin

You may wear certain devices on your skin. Before your scan or procedure, device makers recommend you take off your:

- Continuous glucose monitor (CGM)
- Insulin pump

Talk with your healthcare provider about scheduling your appointment closer to the date you need to change your device. Make sure you have an extra device with you to put on after your scan or procedure.

You may not be sure how to manage your glucose while your device is off. If so, before your appointment, talk with the healthcare provider who manages your diabetes care.

Arrange for someone to take you home

You must have a responsible care partner take you home after your procedure. A responsible care partner is someone who can help you get home safely. They should be able to contact your care team if they have any concerns. Make sure to plan this before the day of your procedure.

If you don't have a responsible care partner to take you home, call one of the agencies below. They'll send someone to go home with you. There's a charge for this service, and you'll need to provide transportation. It's OK to use a taxi or car service, but you still need a responsible care partner with you.

Agencies in New York

VNS Health: 888-735-8913

Caring People: 877-227-4649

Agencies in New Jersey

Caring People: 877-227-4649

Tell us if you're sick

If you get sick (including having a fever, cold, sore throat, or flu) before your procedure, call your IR doctor. You can reach them Monday through Friday from 9 a.m. to 5 p.m.

After 5 p.m., during the weekend, and on holidays, call 212-639-2000. Ask for the Interventional Radiology fellow on call.

Note the time of your appointment

A staff member will call you 2 business days before your procedure. If your procedure is scheduled for a Monday, they'll call you on the Thursday before. They'll tell you what time to get to the hospital for your procedure. They will also remind you where to go.

Use this area to write down the date, time, and location of your procedure:

If you don't get a call by noon (12 p.m.) on the business day before your procedure, call 646-677-7001. If you need to cancel your procedure for any reason, call the healthcare provider who scheduled it for you.

What to do the day before your procedure

Instructions for eating before your procedure



Do not eat anything after midnight (12 a.m.) the night before your procedure. This includes hard candy and gum.

What to do the day of your procedure

Instructions for drinking before your procedure



You can drink a total of 12 ounces of water between midnight (12 a.m.) and 2 hours before your scheduled arrival time. **Do not drink anything else.**

Do not drink anything starting 2 hours before your scheduled arrival time. This includes water.

Things to remember

- Take only the medications your doctor told you to take the morning of your procedure. Take them with a few sips of water.
- Do not put cream (thick moisturizers) or petroleum jelly (Vaseline®) anywhere on your chest.
- Do not wear eye makeup.
- Remove any jewelry, including body piercings.
- Leave all valuables at home if you do not need them.
- If you wear contact lenses, wear your glasses instead, if you can. If you do not have glasses, bring a case for your contacts.

What to bring with you

- Medications for breathing problems, such as inhalers, if you take any.
- Medications for chest pain, if you take any.
- A case for your glasses or contacts.
- Your Health Care Proxy form and other advance directives, if you have completed them.
- Your CPAP or BiPAP machine if you use one. If you cannot bring yours with you, we will give you one to use while you're in the hospital.

What to expect when you arrive

Many staff members will ask you to say and spell your name and date of birth. This is for your safety. People with the same or similar names may be having procedures on the same day.

Meet with a nurse

You'll meet with a nurse before your procedure. Tell them the dose of any medications you took after midnight (12 a.m.) and the time you took them. Make sure to include prescription and over-the-counter medications, patches, and creams.

Your nurse may place an intravenous (IV) line in one of your veins, usually in your arm or hand. If your nurse does not place the IV, your anesthesiologist will do it in the procedure room.

A member of your care team will review your medical history with you to prepare you for sedation (seh-DAY-shun). Sedation is when you're calm, relaxed, or sleepy from medicine you will get before your procedure. They will:

- Ask you if you've had any problems with sedation in the past. This includes nausea (feeling like you're going to throw up) or pain.
- Talk with you about your comfort and safety during your procedure.
- Talk with you about the kind of sedation you'll get.
- Answer questions you have about sedation.

Inside the procedure room

A member of your care team will give you an injection (shot) of local anesthesia. This is medicine to numb the area where they will place the catheter into your skin.

Once the areas are numb, your doctor will make small incisions (surgical cuts). They will place the catheter through the incision on your chest and tunnel it under your skin to the incision at the base of your neck. Then, they will thread the catheter into your vein (see Figure 2).

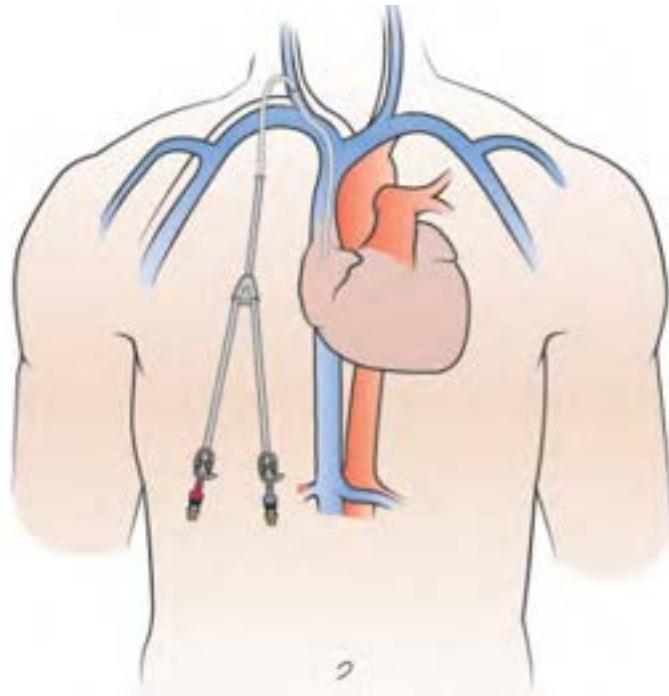


Figure 2. Catheter tunneled under your skin, into a vein

Your doctor will use fluoroscopy (real time X-rays) or ultrasound to help place the catheter. They may also give you an injection of IV contrast. The contrast makes it easier for your doctor to see the area.

Your doctor will use sutures (stitches) to close the incision at the base of your neck. They will put Steri-Strips™ (surgical tape) over the sutures. Then, they will stitch your catheter to your skin at the place where it leaves your body (the exit site). This will keep the catheter in place.

At the end of your procedure, your doctor will put a gauze dressing (bandage) over the incision on your neck. They'll also put a Tegaderm™ dressing over your catheter exit site.

What to do after your procedure

After your procedure, your care team will bring you to the recovery room. You will need to stay in bed until the sedation has worn off. You will then go back to your hospital room or go home with your caregiver.

You may have bleeding, discomfort, or pain at your catheter exit site. It can last for up to 3 days after your catheter is placed. Talk with your healthcare provider about what pain medicine is safe to take.

If you have any bleeding from your exit site, apply pressure and a cold compress to the area. Tell your nurse if you have:

- Bleeding. Your care team may need to change your dressing.
- Pain or discomfort that gets worse.
- Any nausea (feeling like you're going to throw up).
- Any symptoms that concern you.

Do not shower for 24 hours after your procedure.

Your central line discharge kit

Your nurse will give you a discharge kit before your procedure or before you leave the hospital. They will explain how to use the kit.

The discharge kit has:

- 1 toothless clamp
- 1 cannula clamp
- 2 Curot Jet™ strips
- 3 needleless connectors
- 1 package of (10-inch x 12-inch) water guards, such as AquaGuard
- 2 (4-inch x 6 1/8-inch) Tegaderm dressings without CHG
- 2 Nitrile exam gloves
- 10 alcohol Pads
- 1 (4-ounce) package of CHG 4% cleansing soap
- Disinfection caps
- Your doctor's office and emergency telephone numbers

Keep your discharge kit with you at all times. You'll need it if your catheter is leaking, or if your Tegaderm dressing or needleless connector is damaged or comes off.

How to care for your catheter exit site

Always have a Tegaderm dressing over your exit site while your tunneled catheter is in place. The Tegaderm dressing helps prevent infection. Call your healthcare provider if your Tegaderm dressing gets dirty, wet, or peels off. They may need to change your Tegaderm dressing.

Have a nurse change your dressing

Have a nurse change your dressing:

- Within 24 hours (1 day) if you're staying in the hospital after your procedure.
- Within 48 hours (2 days) if you're going home after your procedure and your dressing is gauze and tape. They will replace it with a CHG or non-CHG transparent (clear) dressing.
- Within 7 days if both of these are true:
 - You have a CHG or non-CHG transparent dressing.
 - You can see your insertion site (where the catheter goes into your body).

During these dressing change appointments, the nurse will change your needleless connectors, disinfection caps and flush your catheter. If you cannot come to an MSK site, your nurse will help you make other plans. Call your healthcare provider if you have any questions.

How to care for your neck incision

Two days after your procedure, remove the gauze bandage over the small incision on your neck. You do not need to put a new bandage over the incision.

Leave the Steri-Strips in place until they start to peel off. This can take up to 1 week after your procedure.

How to care for your tunneled catheter at home

Keep the lumens clamped when you are not using your catheter. Keep your catheter secure at all times to keep from pulling it.

Talk with your nurse about the best way to secure your catheter. You can tape the lumens to your skin or tuck them into your bra. Or, you can wrap them in medical tape and pin the tape to your clothing. Take off the pin when changing your clothes to prevent tugging on the catheter.

Do not put tape over the connection site. The connection site is where the needleless connector connects to the lumens.

Check your exit site every day for redness, tenderness or pain, leakage or drainage, swelling, or bleeding. Call your healthcare provider right away if you have any of these signs or symptoms. These are signs you may have an infection.

What to do if your catheter is leaking

1. Clamp your catheter above the leak. Move the white clamp on the catheter so it's above the leak, if you can. If you cannot use the white clamp, use the toothless clamp in your discharge kit (see figure 3).
2. Wipe the area that's leaking with an alcohol pad.
3. **Call your doctor's office right away.**



Figure 3. Toothless clamp

What to do if your Tegaderm dressing is damaged, loose, or dirty

Call your doctor's office right away. Do not take off the damaged, loose, or dirty dressing. Put a new Tegaderm dressing from the discharge kit over it.

What to do if your Tegaderm dressing is wet

Call your doctor's office right away. Do not take off the wet Tegaderm dressing or put another dressing over it.

What to do if your disinfection cap falls off

Throw the disinfection cap that fell off in the trash. Do not put it back on the lumen.

To put on a new disinfection cap:

1. Clean your hands with soap and water or an alcohol-based hand sanitizer.
2. Get a new disinfection cap from your discharge kit. Remove the cap from the strip.
3. Hold the needleless connector in one hand. With your other hand, gently push and twist the new disinfection cap onto the end of the needleless connector.

What to do if your needleless connector falls off

Throw the needleless connector that fell off into the trash. Do not put it back on the lumen.

To put on a new needleless connector:

1. Gather your supplies. You will need:
 - 1 pair of nonsterile gloves
 - 2 alcohol pads
 - 1 new needleless connector
 - 1 new disinfection cap
2. Clean your hands with soap and water or an alcohol-based hand sanitizer. Put the gloves on.
3. Get your supplies ready.
 - Open 1 of the alcohol pad packets, but leave the alcohol pad inside.
 - Open the needleless connector packet, but leave the needleless connector inside.
 - Pull the tab to take the cover off the disinfection cap, but leave the disinfection cap inside its plastic holder.
4. Open the other alcohol pad packet. Using the alcohol pad inside, pick up the lumen with your nondominant hand (the hand you do not write with). Hold it close to the end (see Figure 3).

5. Pick up the other, open alcohol pad with your dominant hand (the hand you write with). Scrub the open end of the lumen with the alcohol pad for 15 seconds. Then throw the alcohol pad in the trash. Let the lumen dry for 15 seconds. Keep holding it with the alcohol pad in your nondominant hand.
6. Pick up the new needleless connector with your free hand. If it has a cover, take the cover off. You can do this using the knuckles of your other hand. Then, twist the new needleless connector onto the end of the lumen (see Figure 4). Keep holding the lumen with the alcohol pad in your nondominant hand.

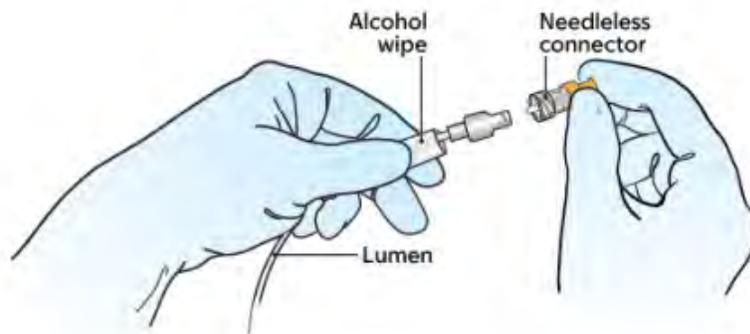


Figure 4. Twisting on the new needleless connector

7. Pick up the plastic holder with the disinfection cap with your free hand. Gently push and twist the disinfection cap onto the end of the needleless connector. Once it's attached, pull off the plastic holder and throw it away.
8. Take your gloves off. Clean your hands.

Call your doctor or nurse after you change the needleless connector.

Guidelines for showering with a tunneled catheter

Keep your skin clean to lower your risk of infection while your tunneled catheter is in place.

Use a waterproof cover

Use a single-use waterproof cover over your dressing, such as Aquaguard®, to shower while your catheter is in place. Your discharge kit will have waterproof covers. You can also buy them online.

Each time you shower, cover your Tegaderm dressing completely with a new waterproof cover to keep it from getting wet. To put on the waterproof cover:

1. Peel off the top and side strips.
2. Place the top edge above your dressing. Do not let the tape on the waterproof cover touch your Tegaderm dressing. It can lift your dressing when you remove the waterproof cover after showering. Smooth the cover down over your dressing.
3. Peel off the bottom strip. Make sure the bottom edge of the waterproof cover is below your dressing. Make sure the lumens of your catheter are tucked into the waterproof cover and completely covered. Smooth the bottom edge down.

Do not shower for longer than 15 minutes. Use warm water, not hot water. This will help keep the waterproof cover from coming off.

Dry the waterproof cover before you take it off. After your shower, fully dry the connection sites.

Use an antiseptic skin cleanser, such as Hibiclens

Wash with an antiseptic skin cleanser, such as Hibiclens, every day while your tunneled catheter is in place. An antiseptic kills germs and bacteria.

Hibiclens comes in liquid form or as wipes. You can buy Hibiclens from any local pharmacy or online. Your care team will send you home with a small bottle when you leave the hospital.

Read *How to Shower Using 4% Chlorhexidine Gluconate (CHG) Solution Antiseptic Skin Cleanser* (www.mskcc.org/pe/chg_solution) to learn more.

Do not submerge your catheter in water, such as in a bathtub, swimming pool or ocean. Watch *Showering While You Have a Central Venous Catheter (CVC)* (www.mskcc.org/pe/shower_cvc) to learn more about showering with a tunneled catheter.

Use Hibiclens® skin cleanser

While your tunneled catheter is in place, keep your skin clean to lower your risk of infection. Wash with Hibiclens every day while your tunneled catheter is in place.

Hibiclens is a skin cleanser that kills germs for up to 24 hours after you use it. It has a strong antiseptic (liquid used to kill germs and bacteria) called chlorhexidine gluconate (CHG). Showering with Hibiclens will help lower your risk of infection. Hibiclens comes in liquid form or as wipes. Wash with Hibiclens every day while your tunneled catheter is in place.

You can buy Hibiclens from any local pharmacy or online. You will be sent home with a small bottle when you're discharged from the hospital.

Instructions for using Hibiclens

1. Use your normal shampoo to wash your hair. Rinse your head well.
2. Use your normal soap to wash your face and genital area. Rinse your body well with warm water.
3. Open the Hibiclens bottle. Pour some solution into your hand or a clean washcloth.
4. Move away from the shower stream to avoid rinsing off the Hibiclens too soon.
5. Rub the Hibiclens gently over your body from your neck to your feet. Don't put the Hibiclens on your face or genital area.
6. Move back into the shower stream to rinse off the Hibiclens with warm water.
7. Dry yourself off with a clean towel after your shower.
8. Do not put on any lotion, cream, deodorant, makeup, powder, or perfume after your shower.

Things to remember when using Hibiclens

- Do not use regular soap, lotion, cream, powder, or deodorant without talking with your nurse first. If you're in the hospital, your nurse might give you a lotion that you can use after using Hibiclens.
- Do not use Hibiclens on your head, face, ears, eyes, mouth, genital area, or on deep wounds. If you have a wound and are not sure if you should use Hibiclens on it, ask your doctor or nurse.
- Do not use Hibiclens if you're allergic to chlorhexidine.
- If your skin gets irritated or you have an allergic reaction when using Hibiclens, stop using it. Call your doctor.

When to call your healthcare provider

Call your healthcare provider right away if:

- You have a fever of 100.4 °F (38 °C) or higher or chills.
- You have bleeding at your exit site. Your care team may need to change your dressing.
- You have pain or discomfort that gets worse.
- Your catheter breaks or leaks. Your care team may need to change your dressing and check your catheter site.
- Your Tegaderm dressing gets damaged, loose, dirty, or wet. Your care team will need to change your dressing and check your catheter site.
- You have redness, tenderness or pain, leakage or drainage, swelling, or bleeding around your catheter exit site.
- Your needleless connector falls off.
- You have any questions or concerns about your catheter.

If you have any questions, contact a member of your care team directly. If you're a patient at MSK and you need to reach a provider after 5 p.m., during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

About Your Tunneled Catheter - Last updated on October 16, 2023

All rights owned and reserved by Memorial Sloan Kettering Cancer Center



PATIENT & CAREGIVER EDUCATION

Autologous Peripheral Blood Stem Cell Harvesting

This information explains what to expect before, during, and after your procedure for harvesting peripheral (peh-RIH-feh-rul) blood stem cells at Memorial Sloan Kettering (MSK).

About Autologous Peripheral Blood Stem Cell Harvesting

Peripheral blood stem cell harvesting is a procedure to harvest (collect) some of the stem cells in your blood. Stem cells are immature cells that make all the blood cells in your body. This includes:

- White blood cells that help your body fight infections and other diseases.
- Red blood cells that carry oxygen from your lungs to the rest of your body.
- Platelets that stop you from bleeding and help your wounds heal.

Autologous (aw-TAH-luh-gus) means your own stem cells will be harvested, stored, and put back (transplanted) into your body in a peripheral blood stem cell transplant. Your stem cells will grow and mature into new blood cells that will replace your cells that were killed during treatment.

Peripheral blood is the blood that circulates (flows) in your blood vessels.

Before Your Procedure

Stem cell mobilization and granulocyte colony-stimulating factor (GCSF) injections

Only a small number of your stem cells naturally circulate in your bloodstream. To raise the number of stem cells in your bloodstream, you'll get injections (shots) of a medication called granulocyte (GRAN-yoo-loh-SITE) colony-stimulating factor, or GCSF.

GCSF helps your body make more stem cells than usual. It also helps the stem cells move into your bloodstream, where they're easier to harvest. This process is called mobilization. Examples of GCSF medications include filgrastim (Neupogen®), pegfilgrastim (Neulasta®), and plerixafor (Mozobil®). Your nurse will talk with you about which injections you'll need.

You'll need an injection every day for about 1 to 2 weeks. Your nurse will tell you when you'll start and stop the injections. You can talk with your nurse about making plans to get the injections, such as coming into the clinic. Or, if you want to do the injections yourself, your nurse will show you how to do it. They'll also give you the resource *How to Give Yourself an Injection of Filgrastim (Neupogen®) or Pegfilgrastim (Neulasta®) Using a Prefilled Syringe* (www.mskcc.org/pe/injection_filgrastim_pegfilgrastim) to help you remember what to do.

Common side effects of GCSF include:

- Bone pain in your sternum (breastbone), arms, legs, and lower back
- Headaches
- Flu-like symptoms, such as:
 - Chills
 - Muscle or body aches
 - Cough
 - Sore throat

- Runny nose
- Vomiting (throwing up)
- Diarrhea (loose or watery poop)
- Fatigue (feeling very tired and weak)
- Nausea (feeling like you're going to throw up)
- A fever of 99 to 100 °F (37.2 to 37.8 °C)

You can take regular or extra strength acetaminophen (Tylenol®) as needed. Don't take nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen (Advil® and Motrin®) and naproxen (Aleve®). These medications can cause bleeding.

If acetaminophen doesn't help, tell your healthcare provider. They'll prescribe something stronger.

Tunneled catheter placement

Before your stem cells are harvested, a nurse will check the veins in your arms to see if they're healthy enough for the procedure. If they're not healthy enough (for example, if they're too small), you'll have a tunneled catheter (a thin, flexible tube) put into a large vein near your collarbone. A tunneled catheter is a type of central venous catheter (CVC).

After your tunneled catheter is placed, your nurse will teach you how to care for it. They'll also give you the resource *About Your Tunneled Catheter* (www.mskcc.org/pe/about_tunneled_catheter) to help you remember what to do.

Your nurse will tell you when your tunneled catheter can be removed. It may stay in place for weeks or months, depending on your care plan. During this time, your nurse will use the 2 access ports attached to your catheter to take samples of your blood, to draw blood during your harvesting procedure, and to give you intravenous (IV) fluids and medications during your stem cell transplant.

What to eat and drink

As your stem cells are harvested, your blood calcium level (the amount of calcium in your blood) may drop. So, the day before and the day of your harvesting procedure, we suggest you eat dairy products and other foods that have a lot of calcium in them. Examples include Greek yogurt, almonds, dark leafy vegetables, and tofu. This will help raise your blood calcium level.

It's also important to drink enough liquids leading up to your harvesting procedure. This will make it easier for the nurse to place the intravenous (IV) lines for your procedure.

You can tell if you're drinking enough liquids by checking the color of your urine (pee). If it's straw-colored or lighter, you're drinking enough. If it's darker, you need to drink more.

The Day of Your Procedure

Where to go

Your harvesting procedure will be at one of the following locations:

Blood Donor Room

Arnold and Marie Schwartz Cancer Research Building
1250 First Avenue (between 67th and 68th Streets)
New York, NY 10065
212-639-7643

Apheresis Unit on the 12th floor

David H. Koch Center for Cancer Care at Memorial Sloan Kettering
530 East 74th Street (between York Avenue and the East River)
New York, NY 10021
646-608-3142

You'll have 2 to 4 appointments for harvesting sessions. Each session usually takes 4 to 5 hours. If you're asked to take filgrastim, you'll need to take your dose on these days before each appointment.

The exact number of sessions you have depends on the number of stem cells

harvested in each session. Your healthcare provider will tell you each day if you need to come back for another harvesting session.

What to expect

You'll lie on a bed or sit in a recliner chair during each harvesting session. A nurse will connect you to a machine. They'll connect you either by an intravenous (IV) line (thin, flexible tube) that's put into a vein in each of your arms or by your tunneled catheter.

The machine will draw blood from one of your IV lines or tunneled catheter access ports. The blood will pass through the machine and the machine will separate out and collect your stem cells. The machine will return the rest of your blood to you through your other IV line or tunneled catheter access port.

You can watch TV, read, or use your smartphone or tablet during your procedure. If you feel cold, you can ask for blankets to keep you warm.

As your stem cells are harvested, you may have muscle cramps, twitching, or feel tingling (a slight stinging or poking feeling) around your lips and fingertips. These are signs your blood calcium level is low. If you have any of these things, tell a nurse. They'll give you Tums®, which are a quick and easy source of calcium. They may also give you a medication that has calcium through your IV line or tunneled catheter.

After Your Procedure

Once you finish the procedure, if you had IV lines in your arms, your nurse will take them out and cover the sites with bandages to prevent bleeding. Leave the bandages in place for at least 3 hours, but not more than 5 hours. If there's bleeding when you take the bandages off, apply gentle but firm pressure on the sites for 3 to 5 minutes. Call your healthcare provider if the bleeding doesn't stop.

If your tunneled catheter was used, your nurse will flush and recap it.

After a harvesting session, you may have bruising at the IV sites. You may

also feel tired. Ask your healthcare provider when you can go back to doing your regular activities. Most people can right away.

Once your stem cells are harvested, they'll be brought to our stem cell laboratory, where they'll be frozen and stored safely until your transplant day. Your care team will tell you how long your stem cells will be frozen and stored. It may be weeks or months, depending on your care plan.

When to Call Your Healthcare Provider

Call your healthcare provider if you have any of the following:

- A fever of 100.4 °F (38 °C) or higher
- Flu-like symptoms
- Any redness, bleeding, drainage, swelling, or pain around your tunneled catheter site or at the IV sites
- Numbness or tingling in your lips, hands, or feet
- A lot of pain on the left side of your body
- A bad headache and any neurological (nerve) changes, such as:
 - Changes in vision
 - Changes in short-term or long-term memory
 - Changes in mobility (your ability to move)
 - A hard time speaking
 - Any other concerning symptoms

If you have any questions, contact a member of your care team directly. If you're a patient at MSK and you need to reach a provider after 5 p.m., during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

Autologous Peripheral Blood Stem Cell Harvesting - Last updated on December 12, 2022

All rights owned and reserved by Memorial Sloan Kettering Cancer Center



PATIENT & CAREGIVER EDUCATION

Eating Well After Your Stem Cell Transplant

This information will help you plan your diet after your stem cell transplant. It explains how to avoid foodborne illness, get enough calories and proteins from your diet, and manage side effects using your diet.

Food Safety After Transplant

What is foodborne illness?

Foodborne illness (often called food poisoning) is an illness that comes from a food you eat.

Sometimes, bacteria, viruses, or parasites attach to food and grow. You can't always see, smell, or taste them. When certain bacteria, viruses, or parasites contaminate (get into) the food you eat, they can cause foodborne illness.

Who is at risk?

Foodborne illness can happen to anyone, but some people are more likely to get it than others. For example, people who have a weakened immune system from cancer and cancer treatment are at higher risk of getting a foodborne illness.

Some people (such as people who've had a stem cell transplant) may need to take extra steps to avoid foodborne illness. Your healthcare team will tell you if this applies to you.

What are the symptoms?

Foodborne illness usually happens within 1 to 3 days after eating the contaminated food. But, it can also happen within 20 minutes or up to 6 weeks later. Symptoms of foodborne illness include:

- Vomiting (throwing up)
- Diarrhea (loose or watery bowel movements (poop))
- Pain in your abdomen (belly)
- Flu-like symptoms (such as fever above 101.3 °F (38.5 °C), headache, body aches, and chills)

If you have any of these symptoms, contact your healthcare provider right away.

What steps can I take to prevent foodborne illness?

It's important to handle food safely to lower your risk of getting a foodborne illness. Foodborne illness can be serious or even fatal.

To help keep yourself safe from foodborne illness, follow these 4 simple steps: clean, separate, cook, and chill.



Clean

Clean your hands and surfaces often.

- Wash your hands with warm water and soap for at least 20 seconds:
 - Before and after handling food.
 - After using the bathroom, changing diapers, handling garbage, or handling pets.
- Wash cutting boards, dishes, utensils (forks, spoons, and knives), and countertops with hot soapy water after preparing each food item.
- Use a glass or plastic cutting board instead of a wooden one. Glass and plastic are easier to clean.

- Use paper towels to clean up kitchen surfaces, if you can. Bacteria, viruses, and parasites can grow on wet or dirty cloth towels and sponges.
 - If you use cloth towels, wash them often using hot water.
 - If you use a sponge, squeeze out all the water after each use. Replace it every 2 weeks.
- Use an antibacterial cleaning spray to clean surfaces. Look for products that have bleach or ammonia (such as Lysol® or Clorox®).
- Rinse all produce (such as fruits and vegetables) under running water. This includes pre-washed salad greens and produce with skins and peels that aren't eaten (such as bananas and avocados). Scrub firm produce (such as melons, oranges, and lemons) to clean them.
 - If you use a produce brush, clean it every 2 to 3 days by putting it in your dishwasher or washing it with hot, soapy water.
- Avoid produce that has bruises or blemishes.
- Clean the lids of canned goods before you open them.



Separate

Separate raw meats from other foods.

- Put raw meats, poultry, and seafood into individual bags in your shopping cart and grocery bags. This will keep any liquids that leak from getting onto other foods.
- In your refrigerator, don't store raw meats, poultry, or seafood above produce and other foods that you don't cook before eating.
- Use one cutting board for produce and a separate one for raw meats, poultry, and seafood.
- Never put cooked food on a plate that previously held raw meat, poultry, seafood, or eggs unless the plate has been washed in hot, soapy water.
- Don't reuse marinades used on raw meats, poultry, or seafood unless you heat them to a boil first.



Cook

Cook to the right temperature.

- Use a food thermometer to check the internal temperature of meat, poultry, seafood, and egg products when you're cooking them. These foods must be cooked to a certain temperature to destroy any harmful bacteria. This is called the safe minimum internal temperature.
- Color and texture can help you know when foods are cooked, but they're not reliable ways to tell if the food is cooked enough to be safe. The best way is to use a food thermometer.
- Cook eggs until the yolk and white are firm. Only use recipes in which eggs are cooked or heated thoroughly.
- When cooking in a microwave oven, cover, stir, and turn the food to make sure it's cooked evenly. If the microwave doesn't have a turntable, rotate the dish by hand once or twice during cooking. Always wait about 10 minutes after the food is done before checking the food's internal temperature with a food thermometer. This lets the food finish cooking.
- When reheating sauces, soups, or gravy, heat them to a boil.
- Eat reheated leftovers within 1 hour.
- Don't reheat leftovers more than once. If you don't finish the food that you reheated, throw it away. Don't put it back in the refrigerator.

Safe Minimum Internal Temperatures	
Beef, pork, veal, and lamb (steaks, roasts, and chops)	145 °F (63 °C) with a 3-minute rest time
Beef, pork, veal, and lamb (ground)	160 °F (71 °C)
Poultry (including chicken, turkey, and duck)	165 °F (74 °C)
Egg dishes and sauces	160 °F (71 °C) or until the yolk and white are firm (not runny)

Fish and shellfish	145 °F (63 °C) and flesh is opaque (not see-through)
Leftovers and casseroles	165 °F (74 °C)



Chill

Chill foods promptly.

- Make sure the refrigerator temperature is 40 °F (4 °C) or below and the freezer temperature is 0 °F (-18 °C) or below.
- Refrigerate or freeze meat, poultry, eggs, seafood, and other perishables (foods that can go bad) within 1 hour of cooking or buying them.
- When it's hot out, use an insulated bag or cooler with ice or frozen gel packs to bring perishables home after shopping.
- Never defrost food at room temperature (such as on the countertop). Defrost food in the refrigerator, in cold water, or in a microwave. If you use cold water or a microwave, cook the food right away once it's defrosted.
- When you marinate food, always marinate it in the refrigerator.
- Divide large amounts of leftovers into shallow containers before refrigerating them. This helps them cool more quickly.
- Eat leftovers within 2 days.

Are there any foods I should avoid?

Some foods are more likely to cause a foodborne illness than others. It's best to avoid these foods. Examples include:

- Raw or undercooked meat, poultry, seafood (including sushi), eggs, and meat substitutes (such as tempeh and tofu)
- Unpasteurized or raw milk, cheese, other dairy products, and honey
- Unwashed fresh fruits and vegetables
- Raw or uncooked sprouts (such as alfalfa and bean sprouts)

- Cold or uncooked deli meats (cold cuts) and hot dogs

Some other foods aren't as risky as the ones above but still have a risk of causing a foodborne illness. Examples are listed in the table below. You can decide if you want to eat or avoid these foods. Your clinical dietitian can help you decide. You may want to be more cautious during the first 3 months after your transplant.

Food Group	Food Items
Milk and dairy	<ul style="list-style-type: none"> • Unrefrigerated milk, cheese, and other dairy products. • Cheese sliced at a deli counter. Choose sealed, pre-packaged cheese instead. • Unrefrigerated desserts or pastries with cream fillings or frosting. Choose packaged, shelf-stable products instead. • Soft-serve ice cream, soft-serve yogurt, and ice cream scooped at a restaurant.
Meat, poultry, seafood, and eggs	<ul style="list-style-type: none"> • Meat sliced at a deli counter. Choose sealed, pre-packaged deli meat instead. • Raw or partially cooked fish and shellfish, including caviar, sashimi, sushi, ceviche, and cold smoked seafood (such as lox). • Clams, mussels, and oysters in the shell. • Refrigerated pâtés and meat spreads.
Fruits and vegetables	<ul style="list-style-type: none"> • Blemished or bruised produce. • Salads and produce from a deli or salad bar. • Raw or frozen rough-textured fruits and vegetables that can't be washed well (such as strawberries, raspberries, blackberries, broccoli, and cauliflower). These are safer if cooked. • Pre-cut fruits and vegetables. • Vegetarian sushi, unless you make it yourself at home. Vegetarian sushi made at a store or restaurant may be prepared near raw fish.
Drinks	<ul style="list-style-type: none"> • Unpasteurized eggnog, apple cider, or other fruit or vegetable juices. • Fresh-squeezed fruit or vegetable juices, unless you make it yourself at home. • Unpasteurized beer and wine (such as microbrewery beers and those that aren't shelf-stable). Talk with your doctor before having any alcohol. • Fountain soda and other fountain drinks.

	<ul style="list-style-type: none"> • Water from a water fountain or other shared container.
Nuts and grains	<ul style="list-style-type: none"> • Unroasted nuts in the shell.
Miscellaneous	<ul style="list-style-type: none"> • Herbal and nutritional supplements, including probiotic supplements. • Shared containers used by many people (such as condiments and milk at a coffee shop). • Any unpackaged, communal, or shared food items (such as free samples).

How can I shop safely?

- Check containers for an expiration date. Buy and use food before that date.
- Don't buy canned, jarred, or boxed foods with dents, swelling, or a broken seal. Don't buy foods from self-service bulk containers or bins.
- Pick up cold and frozen foods (such as milk and frozen vegetables) at the end of your shopping trip. This helps limit the time they will be outside of a refrigerator or freezer.
- If you need to make a stop after grocery shopping, put perishable foods in an insulated bag or cooler with ice or frozen gel packs.
- Put eggs and milk on a shelf inside the refrigerator. Don't store them in the refrigerator door. The inside of the refrigerator stays cooler than the door area.
- If you use a grocery delivery service, make sure all refrigerated and frozen items are at a safe temperature when they're delivered. Put these items into the refrigerator or freezer right away.

Can I eat at restaurants?

Most people should avoid eating at restaurants for about 3 months after their stem cell transplant. Talk with your medical team about when it's safe to eat at restaurants.

Once your healthcare team says you can start eating at restaurants, follow the guidelines below to lower your risk of getting a foodborne illness.

- Choose the restaurant carefully. You can see a restaurant's recent health inspection score by visiting the local Department of Health (DOH) website.
- Order food that's properly cooked. Send back any meat, poultry, fish, or eggs that are undercooked. Food that's steaming hot is usually safer than room temperature and cold foods (such as sandwiches and salads).
- Refrigerate any leftovers within 2 hours of eating out. Reheat them until they're steaming hot (165 °F) and eat them within 2 days.
- Avoid foods that may have raw, unpasteurized eggs (such as Caesar salad dressing, fresh mayonnaise or aioli, and hollandaise sauce).

Some restaurant foods are riskier than others. These include:

- Foods from buffets and salad bars.
- Food that isn't cooked to order (such as fast food and other foods stored under heat lamps).
- Containers used by many people (such as condiments and milk at a cafe).
- Any food handled by employees without gloves or utensils.

Take-out food, delivery food, and food from food trucks can also be riskier because food may not be kept hot or cold enough during transit.

Can I take dietary supplements?

Don't take any supplements, probiotics, homeopathic remedies, or herbal products (such as St. John's wart or traditional Chinese medicines) without talking with your Memorial Sloan Kettering (MSK) medical team first.

In the United States, the way these products are made and stored isn't regulated. This means they may pose a health risk, such as infection or foodborne illness. Dietary supplements can also keep some medications from working as well as they should.

Is my drinking water safe?

Tap water from most highly populated areas (including New York City) is safe to drink. If you're not sure if the tap water is safe, check with the local health department.

If you use well water that isn't routinely tested for bacteria, use bottled water or boil the well water before drinking it. To do this:

- Bring the water to a rolling boil for 15 to 20 minutes.
- Store the water in the refrigerator.
- Don't drink any water that you don't use within 48 hours (2 days).
- Never drink from lakes, rivers, streams, or springs.

General Nutritional Guidelines

Your body needs a balance of calories and protein to work its best. The tips in this section will help you increase the calories and protein in your diet.

These suggestions may be different from the general nutrition guidelines you already know. Your clinical dietitian nutritionist can help you find an eating plan that works best for you.

Tips for adding more calories to your diet

- Don't eat foods that are fat-free or reduced in fat. Avoid food and drink labels that say "low-fat," "non-fat," or "diet." For example, use whole milk instead of skim.
- Snack on dried fruits, nuts, or dried seeds. Add them to hot cereals, ice cream, or salads.
- Add butter, margarine, or oils to potatoes, rice, and pasta. You can also add them to cooked vegetables, sandwiches, toast, and hot cereals.
- Use high-calorie dressings on salads, baked potatoes, and chilled cooked vegetables (such as green beans or asparagus).

- Add sour cream, half and half, or heavy cream to mashed potatoes and cake and cookie recipes. You can also add it to pancake batter, sauces, gravies, soups, and casseroles.
- Use mayonnaise, creamy salad dressing, or aioli sauce in salads, sandwiches, and vegetable dips.
- Top your ice cream or unfrosted cakes with sweetened condensed milk. Mix the condensed milk with peanut butter to add more calories and flavor.
- Drink homemade shakes and other high-calorie, high-protein drinks (such as Carnation® Breakfast Essentials or Ensure®).

Tips for adding more protein to your diet

- Eat foods that are rich in protein, such as chicken, fish, pork, beef, lamb, eggs, milk, cheese, beans, and tofu.
- Add powdered milk to creamy soups, mashed potatoes, milkshakes, and casseroles.
- Snack on cheese or nut butters (such as peanut butter, cashew butter, and almond butter) with crackers, fruits, or vegetables (such as apples, bananas, and celery).
- Blend nut butter into your shakes.
- Add cooked meats to soups, casseroles, salads, and omelets.
- Add wheat germ or ground flax seeds to cereals, casseroles, yogurt, and meat spreads.
- Add grated cheese to sauces, vegetables, and soups. You can also add it to baked or mashed potatoes, casseroles, and salads.
- Add chickpeas, kidney beans, tofu, hard-boiled eggs, nuts, and cooked meats or fish to your salads.

Managing Symptoms and Side Effects with Nutrition

Early Satiety

Early satiety is when you feel full more quickly than usual. For example, you may feel like you can't eat any more when you're only halfway through your meal.

If you feel full quickly, try to:

- Eat small, frequent meals. For example, have 6 small meals instead of 3 large ones.
- Drink most of your liquids before or after meals.
- Choose foods that are higher in calories and protein when making meals.
- Do light physical activity (such as walking). This helps food move through your digestive system.

Nausea

Nausea (feeling like you're going to throw up) can be caused by radiation therapy, chemotherapy, and surgery. It can also be caused by pain, medication, and infection.

If food odors (smells) make you nauseated:

- Try cold foods (such as a sandwich or salad). Cold foods don't smell as strong as hot foods.
- Leave the area while hot foods are cooking, if you can.
- Ask someone else to plate your food for you.
- Let your food cool down for a few minutes before eating.
- Avoid places with strong odors.

The following tips may also help you avoid nausea:

- Eat small, frequent meals. This can stop you from getting too full and

help you eat more food throughout the day.

- Drink most liquids between your meals, not with them. This can help you avoid feeling full too fast or feeling bloated.
- Eat slowly and chew your foods well. Avoid moderate or intense physical activity right after meals.
- Eat your meals in a pleasant setting. Choose a relaxing place with a comfortable temperature. Wear loose-fitting clothing to stay comfortable.
- Eat with friends or family. This may help distract you from your nausea.
- Avoid foods that are:
 - High-fat, such as fatty meats, fried foods (such as eggs and French fries), and soups made with heavy cream
 - Very spicy, such as foods made with heavy spices
 - Very sweet

Diarrhea

Diarrhea is frequent, loose, watery bowel movements. It causes food to move quickly through your intestines.

- Drink at least 8 to 10 (8-ounce glasses) of liquids daily. This will help replace the water and nutrients you lose when you have diarrhea.
- Avoid foods that are very hot, very cold, high-sugar, high-fat, or spicy. These are hard on your digestive system and may make your diarrhea worse.
- Avoid raw fruits and vegetables, whole nuts, and seeds and vegetables that can cause gas (such as broccoli, cauliflower, cabbage, beans, and onions).
- Choose fruits and vegetables that are well-cooked, peeled and puréed, or canned.

Constipation

Constipation is having fewer bowel movements than usual. Constipation can be caused by many things, including your diet, activity, and lifestyle. Some chemotherapy and pain medications can also cause constipation.

If you're constipated, try eating more high-fiber foods. Add fiber to your diet one food at a time. Examples of high-fiber foods include:

- Fruits
- Vegetables
- Whole grains (such as whole-grain cereals, pastas, muffins, breads, and brown rice)
- Nuts and seeds

Be sure to drink enough liquids to prevent gas and bloating. Try to drink at least 8 to 10 (8-ounce) glasses of liquids per day. This will help keep your bowel movements soft.

Dry or sore mouth

When your mouth is dry or sore, eating can be hard or painful. Some foods may be hard to chew and swallow. The way you eat can make a difference.

- Cook your foods until they're soft and tender. Use a blender to purée foods. Ask for a copy of the resource *Eating Guide for Puréed and Mechanical Soft Diets* (www.mskcc.org/pe/pureed_mechanical_soft_diets) for more tips.
- Cut your foods into small pieces that are easy to chew.
- Rinse your mouth with water often.
- Drink liquids with your meals. Take small sips between bites.
- Use a straw when you drink. This will keep the liquid from touching your sore mouth.
- If you have dry mouth, try sugar-free mints or gum. This will help you make more saliva.

Taste changes

Chemotherapy, radiation therapy, and some medications can change your sense of taste. Changes in taste be different from person to person.

If your food seems tasteless, use more spices and flavorings (unless they cause discomfort). For example:

- Add sauces and condiments (such as soy sauce or ketchup) to your food.
- Marinate your meats or meat substitutes in salad dressings, fruit juices, or other sauces.
- Use onion or garlic to flavor your vegetables or meats.
- Add herbs (such as rosemary, basil, oregano, and mint) to your food.

If there's a bitter or metallic taste in your mouth:

- Rinse your mouth with water before meals.
- Maintain good oral hygiene (keep your mouth clean) by:
 - Brushing your teeth (if your doctor says it's okay)
 - Brushing your tongue
 - Drinking more liquids to stay hydrated
- If meats taste bitter, try marinating them in sauces or fruit juices or squeeze lemon juice on them, if your mouth isn't sore.
- Get some of your protein from meat substitutes (such as dairy products and beans).
- Use plastic utensils to reduce the metallic taste.
- Try sugar-free mints or gum.

Fatigue

Fatigue is feeling more tired or weak than usual. It's the most common side effect of cancer and cancer treatments. Fatigue may keep you from doing your daily activities. It can be caused by many things, such as:

- Poor appetite
- Depression
- Nausea and vomiting
- Diarrhea or constipation

Managing these things can give you more energy and help you feel less fatigued. It can also increase your feeling of well-being. Your healthcare team can help you.

Saving your energy can also help you feel less fatigued. You can do this by:

- Asking family and friends for help with shopping and making your meals.
- Buying premade or takeout foods when your energy is low.
- Keeping ingredients and utensils that you use often close at hand.
- Sitting instead of standing when cooking.
- Eating small, frequent, high-calorie meals or snacks. This may help your body need less energy to digest your food.

Often, doing physical activity may actually increase your energy levels. It can also make it easier to do your usual daily activities, increase your appetite, and help you be in a better mood. Talk with your doctor about doing light-to-moderate intensity activities, such as walking or gardening.

If you live alone and can't shop for food or make meals, you may be eligible for food programs, such as God's Love We Deliver or Meals on Wheels. There may be age or income requirements for some programs. Your social worker can give you more information.

If you have any questions, contact a member of your healthcare team directly. If you're a patient at MSK and you need to reach a provider after 5:00 PM, during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

Eating Well After Your Stem Cell Transplant - Last updated on October 29, 2019 All rights owned and reserved by Memorial Sloan Kettering Cancer Center



PATIENT & CAREGIVER EDUCATION

Hair Loss and Your Cancer Treatment

This information will help you understand hair loss during cancer treatment.

About Hair Loss and Your Cancer Treatment

Many people with cancer lose their hair because of chemotherapy, immunotherapy, endocrine therapy, or radiation to the head. There are also other causes of hair loss. These include:

- Having a family history of hair loss
- Being low in certain vitamins
- Going through hormonal changes
- Having certain medical conditions (such as hypothyroidism)
- Having different hairstyles
- Taking certain medications
- Being stressed

If you're starting to lose your hair, it's important to see your dermatologist (skin doctor). They can help you figure out the reason for your hair loss and answer any questions you may have about your hair. Your dermatologist will ask about your history of hair loss and look at the areas where you're losing your hair.

Frequently Asked Questions

Why will I lose my hair during cancer treatment?

Cancer treatments, such as radiation and chemotherapy, attack fast-growing

cancer cells. These treatments can also affect normal cells that grow fast, such as hair cells.

Chemotherapy can cause hair loss on your scalp, pubic area, arms, legs, eyebrows, and eyelashes. Radiation therapy to your head often causes hair loss on your scalp. Sometimes, depending on the dose of radiation to your head, your hair may grow back differently from how it looked before, or it may not grow back at all.

When will I begin to lose my hair?

You may start to see your hair thin or fall out 1 to 4 weeks after your first chemotherapy treatment and 4 weeks after you receive radiation therapy.

The amount of hair that falls out or thins depends on the type, dose, and timing of your treatments. The speed at which it falls out also varies from person to person. You may first notice hair on your pillow in the morning or see it when you shower or brush your hair.

Some people will experience hair thinning rather than hair loss. Hair thinning is when your hair feels and looks thinner in texture. Talk with your healthcare team about what to expect after your chemotherapy or radiation therapy.

When will my hair grow back?

Once you finish your treatments, your hair should begin to grow back. Hair regrowth can take 3 to 5 months. When your hair grows back, it may have a different texture or color. In rare cases, your hair won't grow back as fully as it did before.

There is a very small risk that your hair won't grow back after radiation therapy to your head.

Caring For Your Hair and Head

Here are some ways you can care for your hair and head while you're experiencing hair loss:

- Wash and condition your hair every 2 to 4 days. Use baby shampoo or other

mild shampoo (such as Aveeno® or Vanicream™). You should also use a cream rinse or hair conditioner.

- Use shampoos and conditioners that have sunscreen to prevent sun damage to your scalp.
- Always rinse your hair well and pat it dry with a soft towel.
- Wash your hair after swimming in a pool.
- Don't expose your scalp to the sun.
- Keep your head covered in the summer.
- In the winter, cover your head with a hat, scarf, turban, or wig to keep it warm. This can also help to catch falling hair.
- Sleep on a satin or silk pillowcase. These are smoother than other fabrics and can decrease hair tangles.
- Brush or comb your hair gently with a soft-bristle brush or comb. Start brushing or combing your hair at the ends and gently work your way up to your scalp. You can also comb through your hair with your fingers. Wet your fingers with water first.
- If your hair is long, you may want to have it cut short before you begin treatment.
- Tell your hairdresser that you're receiving chemotherapy. They may be able to recommend gentle hair products.
- Try using Bumble and bumble™ Hair Powder to cover bald spots and thinning areas of your hair. You can buy it at Sephora® or online from various beauty supply websites.

Don't use the following on your hair during treatment because they can be too harsh or pull on your hair:

- Hair spray, hair dye, bleach, or permanents (perms)
- Clips, barrettes, bobby pins, pony tail holders, or hair ties (scrunchies)
 - Don't put your hair in braids, cornrows, or pony tails.

- Hair dryers, curlers, curling irons, or hair straighteners
- Rubber bathing or swimming caps

Wigs, Hairpieces, and Head Coverings

Wigs

If you want to wear a wig, try to get one before your hair falls out because it will be easier to match your hair color and style. If you have already experienced hair loss, bring a photo of your usual hairstyle and, if you can, a lock of your hair. This will help you find a wig that looks like your hair did before your treatment started.

When shopping for a wig, you may want to shop around and compare prices.

A wig should fit well, be comfortable, and be easy to care for. You may want to start wearing your wig as soon as your hair begins to thin. As your hair gets thinner, you may need to have your wig adjusted to make it fit better.

There are many types of wigs and hairpieces. Here is a list of the most common types:

Custom-made wigs

Custom-made wigs are made by hand and are usually the most expensive type of wig. These wigs are made using your specific head measurements. Getting a custom-made wig may require several visits to the wig store for it to be colored, cut, and cleaned. Custom-made wigs are usually made of human hair, but can be made of synthetic (not human) materials.

Customized ready-made wigs

Customized ready-made wigs can be made of human hair, synthetic blends, or a mixture of both. They are made in standard sizes, but can be altered to fit your head. These wigs can be styled and generally cost less than a custom-made wig.

Ready-made or stock wigs

Ready-made or stock wigs are usually made out of a stretchy material and come in 1 size. If you buy a ready-made wig, you can usually take it home the same day that

you purchase it. Ready-made wigs are generally the least expensive type of wig.

Hairpieces

If you lose your hair in only 1 area, you may want to buy a hairpiece rather than a wig. A hairpiece will blend into your own hair. It can be made in any size, color, or shape.

Head coverings

Scarves, turbans, and hats

- Scarves, turbans, and hats can help hold hair that is falling out and hide a bald scalp.
- Scarves made from silk can easily slide off your head. You may want a scarf made of a cotton blend because they can be more comfortable.
- Turbans are sold in many drug stores and come in many different colors and textures.
- You can also wear a hat with or without scarves.

For more information about where to buy wigs and hairpieces, read our resource *Where to Buy Wigs and Hairpieces* (www.mskcc.org/pe/where_buy_wigs_hairpieces).

Financial Support

People who lose their hair from cancer treatment may have insurance coverage for a wig or hairpiece. In this case, your doctor should write a prescription with a diagnosis code showing that your hair loss is due to treatment for cancer. Check with your insurance company for details.

Additional resources for financial support include:

American Cancer Society (ACS)

www.cancer.org

Some American Cancer Society offices offer free wigs to people with cancer. For more information, go to your local American Cancer Society office or call 800-ACS-

2345 (800-227-2345).

CancerCare

www.cancercare.org

CancerCare offers free wigs to people with cancer. Call 800-813-HOPE (800-813-4673) and ask to speak with a social worker.

The Look Good Feel Better Program

The Look Good Feel Better program is designed to help people cope with the effects that cancer treatment can have on their appearance. During weekly sessions, makeup artists teach makeup techniques, skin and nail care, and hair styling and head-covering options. To register for a class, call Look Good Feel Better at 800-395-LOOK (800-395-5665) or visit www.lookgoodfeelbetter.org.

Men can find information at www.lookgoodfeelbetter.org/programs/men.

Medications and Supplements for Hair Loss

Medications and supplements for hair loss can slow hair thinning and increase coverage of your scalp by growing new hair and enlarging existing hairs. Ask your healthcare provider for more information.

They will write their recommendations for you in the space below.

If you have any questions, contact a member of your healthcare team directly. If you're a patient at MSK and you need to reach a provider after 5:00 PM, during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

Hair Loss and Your Cancer Treatment - Last updated on August 4, 2020

All rights owned and reserved by Memorial Sloan Kettering Cancer Center



PATIENT & CAREGIVER EDUCATION

Hand Hygiene and Preventing Infection

This information explains how to clean your hands with soap and water or an alcohol-based hand sanitizer.

Why is hand hygiene so important?

When germs get into your body, they can cause infection. Everyone is at risk for infection while in the hospital. Hand hygiene is the best way to prevent the spread of germs and infections. It only takes 20 seconds of washing your hands or using an alcohol-based hand sanitizer (such as Purell®) to kill germs. Take action by cleaning your hands and asking your visitors to clean their hands.

When should I clean my hands with soap and water?

Clean your hands:

- After using the toilet, urinal, or bedside commode.
- If your hands look dirty.
- Before you eat or prepare food.
- If you have an infection with the germ *Clostridium difficile* (*C. diff*) or norovirus.
- After vomiting (throwing up) or coughing up phlegm (mucus).

What is the right way to clean my hands with soap and water?

1. Wet your hands with warm water. Use liquid soap, if possible. Apply enough soap to cover both your hands.
2. Rub your hands together. Rub the soap over the top of your hands, between your fingers, and in the area around and under your fingernails.
3. Keep rubbing your hands for at least 20 seconds.
4. Rinse your hands well under warm running water.
5. Dry your hands with a paper towel.
6. Use a dry paper towel to turn off the faucet and to open the bathroom door, if needed.



Please visit www.mskcc.org/videos/how-wash-your-hands-properly to watch this video.

When should I clean my hands with an alcohol-based hand sanitizer?

Clean your hands with an alcohol-based hand sanitizer:

- If you don't have soap and water.
- When you leave your hospital room and when you come back.
- Before eating.

If you cannot get out of bed, you can use an individually packaged hand wipe.

What is the right way to clean my hands with an alcohol-based hand sanitizer?

1. Apply enough sanitizer to cover both of your hands.
2. Rub your hands together. Rub the sanitizer over the top of your hands, between your fingers, and in the area around and under your fingernails.
3. Keep rubbing until your hands are dry. It should take at least 20 seconds of rubbing before your hands feel dry. Don't rinse your hands with water or dry them with a towel.

Where can I get more information about hand hygiene?

If you have questions, talk with your healthcare provider. You can also visit the following website for more information:

Centers for Disease Control and Prevention (CDC)

www.cdc.gov/hygiene/personal-hygiene/hands.html

When to call your healthcare provider

Call your healthcare provider if you have any of the following:

- A fever of 100.4° F (38° C) or higher.
- A temperature of 96.8° F (36° C) or lower.
- New or worsening chills or sweating.
- New or worsening redness around a wound.
- New or increased drainage from a wound.
- New or worsening shortness of breath or trouble breathing.
- A heartbeat that is faster than usual.
- New or worsening cough.
- New or worsening pain.

If you have any questions, contact a member of your care team directly. If you're a patient at MSK and you need to reach a provider after 5 p.m., during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

Hand Hygiene and Preventing Infection - Last updated on May 16, 2023

All rights owned and reserved by Memorial Sloan Kettering Cancer Center



PATIENT & CAREGIVER EDUCATION

How to Give Yourself an Injection of Filgrastim (Neupogen®) or Pegfilgrastim (Neulasta®) Using a Prefilled Syringe

This information will teach you how to give yourself a subcutaneous (SUB-kyoo-TAY-nee-us) injection (shot) with filgrastim (Neupogen) or pegfilgrastim (Neulasta) using a prefilled syringe. A subcutaneous injection is an injection that is given under your skin. A prefilled syringe is a syringe that comes with medication inside.

Your healthcare provider will show you how to give yourself the injection. You can use the information in this resource to remember how to do it at home.

Medication Information

Medication name: _____

Medication schedule: _____

Dose: _____

How to Store Your Prefilled Syringes

- Store your prefilled syringes in your refrigerator. Do not store them in your freezer.
 - If the medication inside a syringe freezes, place the syringe near the front of your refrigerator or on one of the shelves inside the refrigerator door. This will help it thaw.
 - If the medication inside a syringe freezes more than once, do not use it. Call your healthcare provider for instructions on what to do next.
- You can leave a prefilled syringe out at room temperature for up to 24 hours. Room temperature is 68 °F to 77 °F (20 °C to 25 °C). Do not leave it in direct sunlight.
 - Do not leave a prefilled syringe out at room temperature for longer than 24 hours. If you do not use it, put it back in your refrigerator.
 - If you leave a prefilled syringe out at room temperature for longer than 24 hours, do not use it. Call your healthcare provider for instructions on what to do next.
- If you have questions about how to store or carry your prefilled syringes when you travel, talk with your healthcare provider or pharmacist.

How to Give Yourself an Injection

Gather your supplies

Place your supplies on a clean, flat surface (such as a table or countertop). You can work in your bathroom if it is private and there is enough space. You will need:

- 1 prefilled syringe with a plastic safety guard attached
- 1 alcohol pad
- An empty, hard plastic container with a screw-top lid (such as a laundry detergent bottle) to throw away the syringe. For instructions on how to choose a plastic container, read *How to Store and Get Rid of Your Home*

Medical Sharps (www.mskcc.org/pe/store_get_rid_sharps).

- 1 (2-inch x 2-inch) gauze pad or cotton ball
- 1 bandage (such as a Band-Aid®)

Get the injection ready

1. **Take the prefilled syringe out of your refrigerator 30 minutes before you plan to give yourself the injection.** The medication should be at room temperature when you inject it.
2. **Do not shake the syringe.** Shaking it may damage the medication inside. If it has been shaken, the medication might look foamy and you should not use it.
3. Check the medication for the following:
 - **Name** – Make sure the name of the medication matches what your healthcare provider prescribed for you. The name is listed on the package or syringe label.
 - **Expiration date** – Make sure the expiration date on the syringe has not passed. If the date has passed, throw away the syringe in the plastic container.
 - **Dose** – Make sure the dose of the medication matches what your healthcare provider prescribed for you. The dose is listed on the colored dot on the package.
 - **Color** – Make sure the medication in the syringe is clear and colorless. **Do not use it if it looks foamy, cloudy, has any color, or has crystals (solid pieces) in it.**

Do not use the syringe if:

- The medication name or dose does not match what your healthcare provider prescribed.
- The medication is expired.
- The medication is foamy, cloudy, has any color, or has crystals (solid

pieces) in it.

If you have another syringe, use that one instead. Then contact your healthcare provider or pharmacist to tell them what happened. You may be able to bring the unused syringe to your local pharmacy so they can replace it.

Choose an injection site

4. Choose an injection site (place on your body to give the injection) where you can pinch a 1 to 2-inch (2.5 to 5-centimeter) fold of skin. It is best to use one of the following areas (see Figure 1):

- The front part of your upper arms
- Your abdomen (belly), except for the 2-inch (5-centimeter) area around your belly button
- The middle front or middle outside of your thighs
- The upper areas of your buttocks (butt), only if someone else is giving you the injection
- The back part of your upper arms, only if someone else is giving you the injection

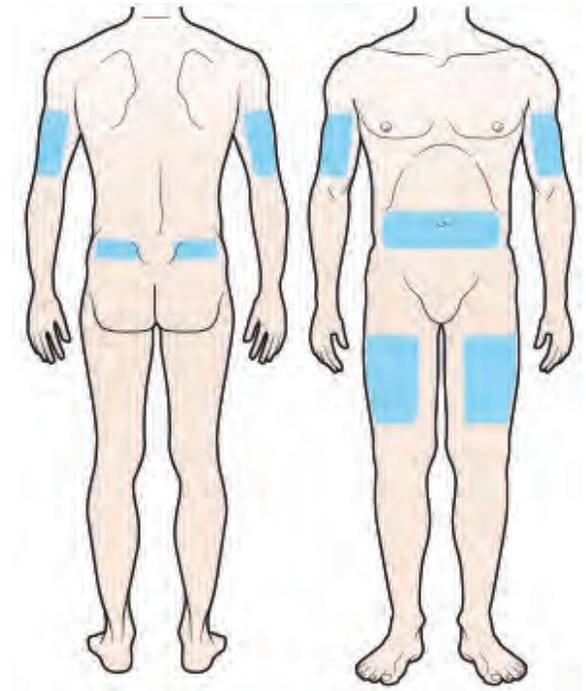


Figure 1. Injection sites

Choose a different injection site each time. It is helpful to use a notebook or calendar to keep track. Switching injection sites will help limit soreness and keep scar tissue from forming. Scar tissue can keep the medication from working like it is supposed to. It also makes it hard to put the needle into your skin.

Do not inject into an area that is tender, red, bruised, hard, or

that has scars or stretch marks.

5. Fold back any clothing covering the injection site.
6. Tear off any 3 edges on a sealed alcohol pad packet. Hold the packet at the edge you did not tear off. Carefully open the packet to expose the alcohol pad, but do not take the pad out. Set the open packet on your clean work area. You will use this alcohol pad to clean the skin at the injection site just before you give yourself the injection.

Give yourself the injection

It is best to give yourself the injection while standing up. If you are sitting or lying down, it may be hard to see the injection site. If you are more comfortable sitting or lying down, ask someone else to give you the injection, such as a caregiver. Make sure your healthcare provider shows this person how to give you the injection.

7. Wash your hands well with soap and water or use an alcohol-based hand sanitizer.
 - If you are washing your hands with soap and water, wet your hands with warm water and apply soap. Rub your hands together for at least 20 seconds, then rinse. Dry your hands with a paper towel. Use that same towel to turn off the faucet.
 - If you are using an alcohol-based hand sanitizer, be sure to cover all parts of your hands with it. Rub your hands together until they are dry.
8. Take the syringe out of its package.
9. With your dominant hand (the hand you write with), hold the syringe around the middle, like a pen or dart. Carefully pull the needle cover straight off (see Figure 2) and throw it away in the plastic container. Once the needle

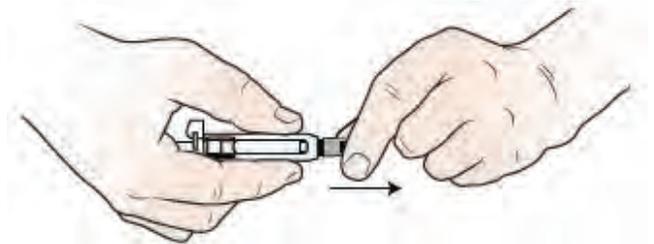


Figure 2. Remove the needle cover

cover is off, do not set the syringe down. **Do not let anything, including your fingers, touch the needle.** If anything touches the needle, throw away the syringe in the plastic container. Start over with a new syringe. After you give yourself the injection, contact your healthcare provider to tell them what happened.

10. Check the syringe for air bubbles. If you see any, hold the syringe with the needle pointing up. Gently tap the side of the syringe with your fingers until the air bubbles rise to the top, near the needle. Slowly push the plunger up to push the air bubbles out of the syringe. Be careful not to push out any medication.
11. Pick up the alcohol pad with your other hand. Using firm pressure, clean the skin at the injection site. Start at the center of the site and move outward in a circular motion. Let your skin air dry before giving yourself the injection. Do not fan or blow on the area to speed up the drying.
12. Make sure you are still holding the syringe around the middle, like a pen or dart. Use your other hand to pinch a 1 to 2-inch (2.5 to 5-centimeter) fold of skin at the injection site.
13. Push the whole needle straight down into your pinched-up fold of skin in one smooth, quick motion (see Figure 3). Do not put your thumb on the plunger yet.
14. After the needle is inserted, let go of your skin. Use your thumb (whichever thumb is more comfortable) to slowly push the plunger all the way down. Push it until all the medication is injected (see Figure 4).



Figure 3: Put the whole needle into your skin

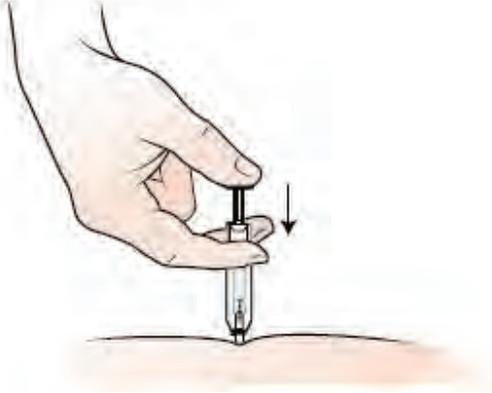


Figure 4. Push the plunger all the way down

15. When the syringe is empty, pull it straight out of your skin. Place a cotton ball or gauze pad over the injection site and gently press down for a few seconds. If needed, put a bandage over the injection site. Do not rub or press hard on the injection site.
16. Depending on the medication you're taking, your syringe will come with either an automatic safety guard or a manual safety guard. With an automatic safety guard, the safety guard will automatically slide over the needle and cover it. With a manual safety guard, you will use your hands to slide the safety guard over the needle to cover it.
 - **If your syringe has an automatic safety guard:** Slowly let go of the plunger. The safety guard will automatically slide over the needle until the needle is completely covered. You will hear the safety guard click into place.
 - **If your syringe has a manual safety guard:** Be careful to not poke yourself with the needle. Hold the clear plastic finger grips on the sides of the syringe with one hand. Hold the safety guard with your other hand. Slide the safety guard over the needle until the needle is completely covered (see Figure 5). You will hear the safety guard click into place.

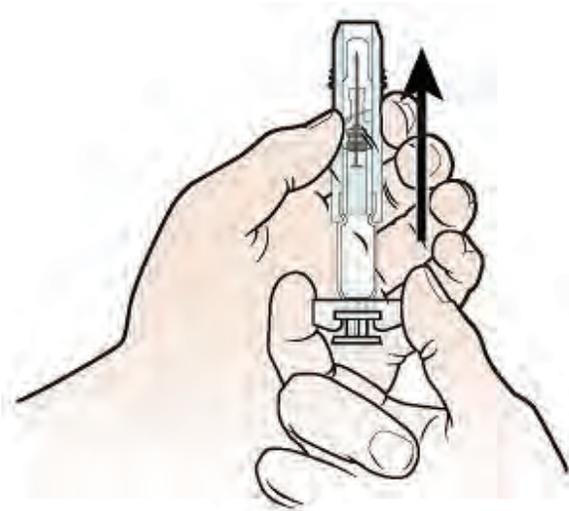


Figure 5. Slide the safety guard until it clicks and covers the needle

17. Throw away the syringe in the plastic container. Do not use a prefilled syringe more than once.

How to Store and Get Rid of Your Used Syringes

Keep your plastic container in a safe place. Read *How to Store and Get Rid of Your Home Medical Sharps* (www.mskcc.org/pe/store_get_rid_sharps) for information about choosing a plastic container and getting rid of your used syringes and other home medical sharps.

When to Call Your Healthcare Provider

Call your healthcare provider if:

- The injection site will not stop bleeding
- You have very bad pain at the injection site
- You inject the medication into the wrong area
- You have a fever of 100.4 °F (38 °C) or higher
- You have signs of an allergic reaction, such as swelling, redness, itching,

or a rash at the injection site or anywhere else on your body

- You cannot use a syringe because the medication is expired (the expiration date on the syringe has passed), foamy, cloudy, has any color, or has crystals (solid pieces) in it
- You cannot use a syringe because something touches the needle before the injection
- You have trouble giving yourself the injection
- You have questions about how to give yourself the injection correctly

If you have any questions, contact a member of your care team directly. If you're a patient at MSK and you need to reach a provider after 5 p.m., during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

How to Give Yourself an Injection of Filgrastim (Neupogen®) or Pegfilgrastim (Neulasta®) Using a Prefilled Syringe - Last updated on February 3, 2022
All rights owned and reserved by Memorial Sloan Kettering Cancer Center



PATIENT & CAREGIVER EDUCATION

Sexual Health and Intimacy

This information explains how to maintain sexual health and intimacy during cancer treatment.

It's common for people to feel changes in their body during and after cancer treatment. There may be things you can see right away, like surgical scars, drainage tubes, and catheters (thin, flexible tubes). You may have changes to your body, such as losing your hair, changes in your weight, pain, or fatigue (feeling more tired or weak than usual).

These physical changes may affect how you feel about yourself or how you relate to your partner. They can affect your interest in sexual activity. They may also lessen your enjoyment and pleasure in sexual activities.

Here are some suggestions and resources to help you adjust and cope during this time.

Managing Your Feelings

During and after your cancer treatment, you may feel different. To help you deal with this, it's important to talk about how you feel. Family and friends can help. Your nurse, doctor, and social worker can reassure, support, and guide you. Here are some ways you can manage your feelings during and after cancer treatment:

- Figure out what you enjoy about yourself or what things make you feel special. These may be related to your family, friends, personal interests, or work life.
- Spend time doing activities and being with people that you enjoy.
- If your faith is important, maintain your spiritual or religious practices.
- Choose clothes that make you feel good.

- Have your favorite clothes altered to fit better.
- Take part in an online or in-person “[Look Good Feel Better](#)” program. See the section External Resources” for more information.

Maintain Physical Intimacy With Your Partner

- Talk with your partner about your physical relationship. Talk about what you think would help you feel close and give you both pleasure. Share your concerns with them so that you can find solutions together.
- Increase intimate and sensual touching. Hug, caress, cuddle, touch, and hold hands to feel closer to each other.
- Try being intimate at times when you have more energy.
- Being relaxed can help with sexual enjoyment. Select a time and place when you can relax and have privacy.
- If sex is difficult or uncomfortable:
 - Try different sexual positions. Some may be less tiring or more comfortable.
 - Vaginal moisturizers and lubricants can be helpful for women. For more information, read the resource *Improving Your Vulvovaginal Health* (www.mskcc.org/pe/improving_vulvovaginal_health). You can find it online, or you can ask your nurse.
 - Medications to help with erections (getting hard for sex) can be helpful for men. Talk with your healthcare provider for more information.

Special points related to sexual activity

The following are special factors you should think about before starting sexual activity during or after your cancer treatment:

- Ask your healthcare provider if there are any safety measures you should use for different types of sexual activity (such as oral, anal, or vaginal sex).
- Ask your healthcare provider if your blood cell counts are high enough for you to have safe sex.

- Your white blood cell count should be high enough to prevent infection.
- Your red blood cell count should be high enough to prevent bleeding.
- Use a condom to protect yourself from sexually transmitted infections (STIs), including HIV, especially if you have more than 1 partner.
- If there's any chance you or your partner can become pregnant, use birth control (contraception) during your cancer treatment. If you have any questions about birth control, or for help deciding the type of birth control that's right for you, talk with your healthcare provider.
- Ask your healthcare provider how long you should use birth control after your cancer treatment is over.
- Some cancer treatments may affect your fertility (the ability to become pregnant with a biological child). If you have questions about this, ask your healthcare provider.

For more information, read *Sex and Your Cancer Treatment* (www.mskcc.org/pe/sex_cancer_treatment).

Talk With Your Healthcare Provider if:

- You have vaginal dryness or tightness that makes sexual activity painful. Simple solutions such as vaginal lubricants or moisturizers can help.
 - You can also ask for a referral to our Female Sexual Medicine and Women's Health Program. Call 646-888-5076 to make an appointment.
- You have trouble getting or keeping an erection (erectile dysfunction) or have a low testosterone hormone level. Your healthcare provider can recommend medication that may help.
 - You can also ask for a referral to our Male Sexual and Reproductive Medicine Program. Call 646-888-6024 to make an appointment.
- You have emotional issues affecting your sexual health, such as having a low desire to have sex.
 - You can also ask for a referral to our Female Sexual Medicine and Women's

Health Program or our Male Sexual and Reproductive Medicine Program.

- You have accidental leakage of urine (pee) or bowel movements (poop). This is called incontinence. Your healthcare provider can give you a referral to the Sillerman Center for Rehabilitation or call 646-888-1900 to make an appointment.
- You have any questions or concerns.

MSK Support Services

Female Sexual Medicine and Women's Health Program

646-888-5076

Our [Female Sexual Medicine and Women's Health Program](#) helps women who are dealing with cancer-related sexual health issues. For more information, or to make an appointment, call 646-888-5076.

Male Sexual and Reproductive Medicine Program

646-888-6024

Our [Male Sexual and Reproductive Medicine Program](#) helps men who are dealing with cancer-related sexual health issues. For more information, or to make an appointment, call 646-888-6024.

Sillerman Center for Rehabilitation

646-888-1900

515 Madison Avenue (Entrance on East 53rd Street, between Park and Madison Avenues)

New York, NY 10022

Some types of cancer and treatments can damage your pelvic muscles (muscles that support your pelvic organs (uterus, bladder, and bowel). This can cause back and pelvic pain and urinary or fecal incontinence. If you're having these problems, ask your healthcare provider for a referral.

Counseling Center

646-888-0200

641 Lexington Avenue, 7th Floor (on East 54th Street between Third

and Lexington Avenues)
New York, NY 10022

Many people find that counseling helps them manage their feelings. We provide counseling for individuals and couples to help you process any issues and work with you to solve problems. Your partner can attend these sessions with you, if you would like.

External Resources

American Cancer Society (ACS)

www.cancer.org

800-ACS-2345 (800-227-2345)

[The ACS has free booklets on cancer and sexual health called *Sex and the Adult Male With Cancer* and *Sex and the Adult Female With Cancer*. You can search for them on \[www.cancer.org\]\(http://www.cancer.org\) or call to request printed copies.](#)

Look Good Feel Better Program

www.lookgoodfeelbetter.org

800-395-LOOK (800-395-5665)

This program offers workshops to learn things you can do to help you feel better about your appearance. For more information or to sign up for a workshop, call the number above or visit the program's website.

National Cancer Institute (NCI)

www.cancer.gov

Visit the NCI's website to learn more about sexual health and cancer.

If you have any questions, contact a member of your healthcare team directly. If you're a patient at MSK and you need to reach a provider after 5:00 PM, during the weekend, or on a holiday, call 212-639-2000.

For more resources, visit www.mskcc.org/pe to search our virtual library.

Sexual Health and Intimacy - Last updated on March 2, 2020

All rights owned and reserved by Memorial Sloan Kettering Cancer Center

Glossary

This glossary explains terms that you may read in this guide or hear from your transplant team. If you hear a word or expression not listed here, don't be afraid to ask your doctor or nurse.

Absolute neutrophil count - The percentage of polys and bands that are part of your total white blood count. If your ANC is less than 1,000 (or 1.0), you're at high risk for infection.

Ablative therapy (ab-lay-tive) - Treatment that removes or destroys the function of an organ or system. For example, high-dose chemotherapy and radiation before a stem cell transplant is considered ablative therapy because it wipes out your immune system.

Afebrile - Having no fever; normal temperature.

Allogeneic stem cell transplant – A type of transplant where stem cells are taken from a donor and given to a patient.

Alopecia (al-o-pee-shuh) – See hair loss.

Ambulatory - The ability to walk; not confined to bed.

Anal - Related to the anus.

Analgesic - A medication used to reduce pain.

Anaphylaxis - An allergic reaction ranging from relatively mild (hives) to very serious (shock).

Anemia (uh-neem-ee-uh) - Low red blood cell count, which can cause you to feel fatigued and have shortness of breath. Anemia can be caused by a variety of conditions and diseases.

Anesthesiologist (an-es-the-zee-ol-o-jist) - A doctor who specializes in giving medications or other substances that prevent or relieve pain, especially during surgery.

Anesthetic - A medication or other substance that causes a loss of feeling or awareness. Local anesthetics cause a loss of feeling in 1 small area of the body. Regional anesthetics cause a loss of feeling in a part of the body, such as an arm or leg. General anesthetics cause a loss of feeling and a complete loss of awareness that feels like a very deep sleep.

Antibiotic – Medication used to kill organisms that cause disease. Since some cancer treatments can reduce your body's ability to fight infection, antibiotics may be used to treat or prevent these infections.

Antibody - A protein produced by immune system cells and released into your blood. Antibodies defend against foreign substance such as bacteria. For example, if you get a tetanus vaccine, you'll make a protein (antibody) which protects against tetanus, called a tetanus antibody. Each antibody works against a specific substance called an antigen.

Anticoagulant - Medication that reduces your blood's ability to clot.

Antiemetic (an-ti-eh-meh-tik) - A medication that prevents or relieves nausea and vomiting.

Antifungal - A medication that kills fungi (organisms that cause infections). Patients undergoing treatment for cancer are especially vulnerable to fungal infections.

Antigen (an-tuh-jen) - A substance that causes your body's immune system to react. This reaction often involves the production of antibodies. Cancer cells have certain antigens that can be found by laboratory tests. They are important in cancer diagnosis and in watching response to treatment.

Antihistamine - A medication used to relieve the symptoms of allergies, such as hives, stuffy nose, etc.

Antimicrobial - A substance that kills microorganisms such as bacteria or mold or stops them from growing and causing disease.

Antinausea – See antiemetic.

Antioxidants (an-ti-ox-uh-dents) - Compounds that hold back chemical reactions with oxygen and are thought to reduce the risk of some cancers. Examples are vitamins C, E, and beta-carotene.

Apheresis - A procedure in which blood is collected, part of the blood (such as platelets or white blood cells) is taken out, and the rest of the blood is returned to the donor. Also called pheresis.

Aplastic anemia – A disease in which the bone marrow is not able to make enough blood cells.

Artery - A vessel that carries oxygen-rich blood from your heart to your tissues. Blood is under pressure in arteries.

Autologous - Taken from an individual's own tissues, cells, or DNA.

Autologous stem cell transplant – A type of transplant in which a person's own stem cells are harvested, preserved, and returned to them.

Axilla (ax-il-la) - Your armpit.

Bacteria (singular bacterium) - Small germs that can cause infection.

Benign - Not malignant or cancerous.

Biopsy (buy-op-see) - The removal of a sample of tissue to see whether cancer cells are present and to determine an exact diagnosis. There are several kinds of biopsies.

Blast cells - Immature blood cells.

Blood - The body fluid that flows through all your vessels except the lymph vessels and performs a number of critical functions. Blood is composed of a liquid portion called plasma and 3 other components: red blood cells, white blood cells, and platelets.

Blood chemistries - Multiple chemical determinations of your blood content. These tests are helpful in assessing your kidney and liver function.

Blood count - A lab study to evaluate the amount of white blood cells, red blood cells, and platelets in your body.

Blood culture - A blood sample taken to find infection in the blood

Blood transfusion - The infusion of red blood cells or platelets into your bloodstream to replace blood loss or to treat anemia.

Blood typing and cross matching - Making sure that the blood from a donor is compatible with yours before a blood transfusion. Blood cells contain factors that aren't the same in all people. Before a transfusion can be given, blood samples from you and the donor are typed, or classified, according to which of these factors are present. The 4 principal red blood cell types or groups are A, B, AB, or O. Other factors such as Rh factor must also be checked.

Bone marrow - The spongy material in the center of bones where blood cells are made.

Bone marrow aspiration and biopsy - A procedure in which a needle is placed into the cavity of a bone, usually the hip or breast bone. A small amount of bone marrow is removed and examined under a microscope.

Bone marrow, stem cell, or cord blood transplant - A treatment for cancer, which severely injures or destroys your bone marrow. You're given high-dose chemotherapy with or without radiation (total body irradiation) to kill the cancer cells. The medications also destroy your remaining bone marrow, preventing your body's natural ability to fight infection. In allogeneic transplantation, the donor of the stem cells is another person. Stem cells can come from bone marrow, blood, or umbilical cord blood. In autologous transplantation, stem cells are taken from the patient. Some of your own bone marrow or stem cells are removed and set aside before treatment and then reinfused into your body. Blood cells start being produced a few weeks later.

Bone scan - An imaging method that gives important information about the bones, including the location of cancer that may have spread to the bones. A low-dose radioactive substance is injected into a vein and pictures are taken to find any abnormalities.

Bowel - Pertaining to your intestines.

Bowel movement - Movement of feces through the bowel and out the anus. Also called defecation.

Brain scan - An imaging method used to find anything abnormal in the brain, including brain cancer and cancer that has spread to the brain from other places in the body. A radioactive substance is injected into a vein and pictures are taken to find any abnormalities.

Breastbone - The long, flat bone that forms the center front of your chest wall. Your breastbone is attached to your collarbone and your first 7 ribs. Also called the sternum.

Capillaries - Tiny blood vessels located throughout the tissues of your body. They connect your arteries with your veins. Substances pass through them to nourish your cells.

Cardiac - Pertaining to your heart.

Cardiomyopathy - Damage to the heart muscle affecting the way the heart pumps blood through the body.

CAT scan or computed axial tomography - A series of detailed pictures of areas inside the body taken from different angles. The pictures are created by a computer linked to an x-ray machine. Also called computed tomography scan, computerized axial tomography scan, computerized tomography, and CT scan.

Cataracts - A clouding of the lens of the eye that can result from radiation therapy.

Catheter (cath-eh-tur) - A thin, flexible tube through which fluids enter or leave the body. For example, a tube to drain urine.

Central venous catheter - A thin, flexible tube that's put into a vein in the upper arm, thigh, neck, or below the collarbone. It's guided (threaded) into a large vein near the heart called the vena cava or into the right atrium of the heart. It's used for taking blood samples and giving liquids, blood transfusions, chemotherapy, and other medications. It avoids the need for repeated needle sticks.

Central venous line - A method of giving IV fluids, blood products, and medications. A catheter is put into a neck vein and into your other large blood vessels. There are many different types of central line catheters that may have multiple ports or lumens. Multiple ports allow more than one IV solution to be given at one time. Blood can also be drawn from this type of catheter.

Chemotherapy - Medications used to destroy cancer cells. Chemotherapy is often used with surgery or radiation to treat cancer.

Chimerism studies - A test that shows how much of the blood is from the patient and how much is from the donor.

Clinical trials - Human research studies that test new drugs or treatments and compare them to current, standard treatments. Before a new treatment is used on people, it's studied in the lab. If the lab studies suggest the treatment works, it's tested with people. These human studies are called clinical trials. Your doctor may suggest a clinical trial. Participation is voluntary.

Clot - To change from a liquid form into a solid or semi-solid; for example, when blood clots, it changes from a liquid to a semi-solid, helping to stop bleeding.

Colon - Your large intestine.

Colony stimulating factors (CSF) - Types of growth factors that promote growth and division of blood-producing cells in bone marrow. CSFs are naturally produced in the body. Extra amounts may be given to reduce or prevent side effects of chemotherapy. See growth factors.

Complementary therapy - Therapies used in addition to conventional therapy. Some complementary therapies may help relieve certain symptoms of cancer, relieve side effects of conventional cancer therapy, or improve a patient's sense of well-being.

Complete blood count (CBC) - A blood test to measure the type and number of blood cells. The values are expressed in percentages.

Constipation - Difficulty having a bowel movement.

Contagious - An illness that can be spread from one person to another. Cancer is not contagious.

Creatinine clearance - A test that compares the level of creatinine in urine with the level of creatinine in the blood. Creatinine is a breakdown product of creatine, which is an important part of muscle. The test helps provide information on kidney function.

Culture - A procedure using a sample of blood, urine, throat secretions, or other biological material. It determines the specific germ (bacteria, fungus, or virus) responsible for an infection. Cultures also help determine which antibiotics may work best.

Cytogenetics - The process of analyzing the number and shape of cell chromosomes. The normal number of chromosomes is 46. Chromosomes may change when a patient develops cancer.

Cytomegalovirus (CMV) - A virus that can cause serious illness in people who have weak immune systems.

Decongestant - A medication that helps shrink mucous membranes and decrease the production of mucus.

Dehydration - Excessive loss of fluids from your body.

Diagnosis - Identifying a disease by its signs or symptoms and by using imaging procedures and laboratory findings.

Diarrhea - Frequent, loose, and watery stools.

Dietitian - A health professional with special training in nutrition who can help with dietary choices. Also called a nutritionist.

Diuretic - Substance that increases the elimination of water and salts (urine) from your body.

Dizziness - A sensation of instability and sometimes a feeling that you're about to fall.

Donor leukocyte infusion - A transfusion of whole blood or isolated lymphocytes that contain a calculated dose of T lymphocytes. This is sometimes given to treat a recurrence of a patient's original disease or for the treatment of certain viral infections.

Dose - The amount of medication taken, or radiation given, at one time.

Dysphagia - Difficulty swallowing.

Dyspnea - Shortness of breath.

Dystonic reaction - Tightening of your facial and neck muscle. It's a possible side effect of some antiemetic medications.

Echocardiogram (ultrasound cardiography) - A method of obtaining a graphic picture of the internal structure, position, and motion of your heart. It's done by using sound waves directed through your chest.

Edema - Build up of fluid within the tissues; swelling.

Electrocardiogram (EKG) - A method of evaluating your heart's rhythm and muscle function by measuring electrical impulses.

Electrolytes - A general term for the many minerals needed to provide the proper setting for the cells of your body. Common electrolytes include calcium, sodium, potassium, and chloride.

Emesis - To vomit.

Engraftment - When stem cells infused into the body start to fix in place, grow, and make new blood cells.

Epstein-Barr virus (EBV) - The virus that causes mononucleosis (also called “mono” or “kissing disease”). In patients whose immune system is not normal, it can cause an EBV-associated lymphoma. Symptoms include fever and swollen lymph nodes.

Esophagitis - An inflammation of the esophagus.

Esophagus - A tube that carries swallowed food to your stomach.

Excision - Surgical removal of tissue.

Expectorant - Medication that makes mucus in your respiratory tract thinner and easier to cough out.

Febrile - Fever; elevated body temperature.

Fellow - A physician who has completed residency. May be a fully trained pediatrician or internist and is doing further study to become a subspecialist in a field of interest.

Fertility preservation - A type of procedure used to help preserve a person’s ability to have children. A fertility preservation procedure is done before a medical treatment that may cause infertility, such as radiation therapy or chemotherapy. Examples of fertility preservation procedures include sperm banking, egg freezing, in vitro fertilization with embryo freezing, and certain types of surgery for cervical and ovarian cancer.

Filgrastim - A medication used to increase the number of white blood cells in people who are receiving chemotherapy. Also called Neulasta® or pegfilgrastim.

Fractionated radiation - The total dose of a radiation treatment divided over several days.

Fungi (singular fungus) - A group of microorganisms larger than either bacteria or viruses. They can cause a serious infection when your immune system is compromised.

Gamma globulin - A protein component of blood plasma. It contains antibodies that are helpful against certain infections.

Gastroenterologist (gas-tro-en-ter-ol-o-jist) - A doctor who specializes in diseases of the digestive (gastrointestinal) tract.

Gastrointestinal tract/GI tract - The digestive tract. It’s made up of the organs and structures that process and prepare food to be used for energy, such as your stomach, small intestine, and large intestine.

GCSF (granulocyte colony-stimulating factor) - Medications that stimulate the production of neutrophils (a type of white blood cell). These include filgrastim (Neupogen®), pegfilgrastim (Neulasta®), and plerixafor (Mozobil®).

General anesthetic - A medication that puts you to sleep to prevent pain during a surgery.

Genital - Refers to the genitalia (external and internal sex organs and glands).

Gland - See lymph node.

Graft - New stem cells that are growing

Graft versus host disease (GVHD) – A reaction of donor cells (graft) against the patient's (host) body; can be short-term (acute) or long-term (chronic).

Groin - The area of your body where the legs join the abdomen.

Growth factors - A naturally occurring protein that causes cells to grow and divide. Too much growth factor production by some cancer cells helps them grow quickly. Other growth factors help normal cells recover from the side effects of chemotherapy.

Hair loss - This often happens as a result of chemotherapy or from radiation therapy to the head. In most cases, the hair grows back after treatment ends.

Harvest - The removal of bone marrow or peripheral blood stem cells to be used for a hematopoietic blood stem cell transplant (HCT).

Hematocrit - The percentage of the volume of whole blood that's made up of red blood cells.

Hematopoietic blood stem cell transplant (HCT) – See bone marrow, stem cell, or cord blood transplant.

Hematologist (hem-uh-tahl-o-jist) - A doctor who specializes in diseases of the blood and blood-forming tissues.

Hematology - The study of blood and blood-forming organs.

Hematology/oncology (HEME/ONC) - A branch of medical science that treats disorders of the blood, blood-forming tissues, and tumor cells.

Hematoma (hem-uh-to-ma) - A collection of blood outside a blood vessel caused by a leak or an injury; a bruise.

Hematuria - Blood in the urine. Urine may be pink, red, or brown (cola colored).

Hemoglobin - The substance in red blood cells that carries oxygen.

Hemorrhage - A term for loss of blood from injury to the blood vessels or by a lack of certain blood elements, such as platelets.

Hemorrhagic cystitis - Bleeding into the bladder that causes bloody urine. It can be caused by certain viruses, as well as certain chemotherapy medications such as ifosfamide or cyclophosphamide.

Heparin - A medication that decreases the ability of blood to clot. It's often used to prevent clotting in central line catheters.

Hepatitis - An inflammation of the liver usually resulting in jaundice.

Herpes simplex - A virus that usually produces fluid-filled blisters on the skin and mucus membranes.

Herpes zoster - A virus that causes shingles, which are painful skin eruptions.

Hives - Itching welts caused by an allergic reaction.

HLA (human leukocyte antigens) - Proteins (antigens) that appear on white blood cells, as well as cells of almost all other tissues. By typing for HL-A antigens, donors and recipients of white blood cells, platelets, and organs can be "matched." This helps to make sure the transfused and transplanted cells will survive.

Hodgkin's disease - A type of cancer that affects the lymphatic system. It happens in lymph nodes. Named for the doctor who first identified it.

Hospitalist - A doctor who specializes in the care of hospitalized patients.

Host - The person into whom stem cells have been infused.

Hydration - A reference to the amount of water in the body. You may be dehydrated, well hydrated, or excessively hydrated (edematous).

Hyperglycemia - High blood sugar.

Hypertension - High blood pressure.

Hypocalcemia - Not enough calcium in the blood.

Hypoglycemia - Low blood sugar.

Hypokalemia - Not enough potassium in the blood.

Hypotension - Low blood pressure.

Ileus - Severe constipation.

Iliac crest - The top edge of your hip bone. Marrow is usually taken from it for a diagnosis of blood cell diseases.

Immune reaction - A reaction of normal tissues to substances recognized as "foreign" to the body.

Immune system - The system that defends the body against infection from bacteria and viruses. The immune system may also help the body fight some cancers.

Immunity - The state of your body's defenses against an infection or possibly against a certain cancer.

Immunizations - Vaccines given to help your body resist disease.

Immunosuppression (im-mune-no-suh-preh-shun) - A state in which your immune system doesn't respond properly. This condition can be present at birth. It can also be caused by certain infections (such as human immunodeficiency virus or HIV), or by certain cancer therapies.

Immunotherapy (im-mune-no-ther-uh-pee) - Treatments that promote or support your immune system's response to a disease such as cancer.

Implantable port (such as Port-a-Cath®, Infuse-a-Port®, or Mediport®) – A device that delivers fluids, medications, or blood directly into a vein. The entire device is implanted under the skin during surgery and can be used for an extended period of time.

Incubation period - The period between exposure to a germ and the first sign of illness (for example, chicken pox, from 8 to 21 days).

Indwelling catheter (such as Broviac® or Hickman®) - A central line surgically placed (usually in the chest) and into a large vein in your neck. It's used to give medications, fluids, and blood products. May also be used to draw blood for testing.

Infection - Invasion of the body by disease-producing organisms.

Infectious disease - A disease caused by germs; one that can be passed from one person to another. Cancer is not an infectious disease.

Infertility - Not being able to produce children.

Inflammation - The triggering of local body defenses. It results in the outpouring of defensive cells ("polys") from the circulation system into the tissues. Frequently associated with pain and swelling.

Informed consent - A legal document that explains a course of treatment and the risks, benefits, and possible alternatives. The process by which patients agree to treatment. If you're under 18 years of age, your parents or legal guardian must also sign this form.

Infusions - The introduction of a fluid into a vein.

Injections - Injections may be given intramuscularly (into a muscle), intravenously (into a vein), subcutaneously (just under the skin), or intrathecally (into the spinal column space).

Inpatient - A patient who is admitted to the hospital for treatment requiring an overnight stay.

Intern - A doctor in the first year of training following graduation from medical school.

Interstitial pneumonia - Inflammation of the lung caused by a virus or due to damage from chemotherapy and/or radiation therapy.

Intrathecal (IT) - Within the spinal column. IT medication is given directly into the spinal column.

Intravenous (IV) - The administration of a medication or fluid directly into the vein.

Investigational drugs - Medications being studied by clinical investigation.

Irradiated - Treated with radiation.

Irradiated blood products - Blood products that have been exposed to a radiation source to inactivate the lymphocytes that could otherwise cause graft versus host disease.

Jaundice - A yellow color of the skin and white portion of the eyes. It's from a buildup of bilirubin, which is a broken down product of hemoglobin. It's a sign of liver disease or a blockage of the major bile ducts.

Kidney - The main organ involved in the filtering of certain bodily wastes. Also maintains the proper mineral and water balance.

Laxative - A substance that encourages bowel movements.

Lesion (lee-zhun) - A change in body tissue; sometimes used as another word for tumor.

Leukapheresis - The process of filtering white cells, leukocytes, or "polys" from the blood of the patient or a healthy donor. These cells may be given to you if you have a severe infection and a shortage of "polys."

Leukemia (loo-key-me-uh) - Cancer of the blood or blood-forming organs. If you have leukemia, you may have a noticeable increase in white blood cells (leukocytes).

Leukocytes - White blood cells that play a major role in the body's defense system. The cells are divided into granulocytes, lymphocytes, and monocytes.

Leukocytosis (loo-ko-sigh-toe-sis) - Having more than the usual number of white blood cells.

Leukopenia - Decrease in white blood cell count.

Liver - An organ in your body that performs many complex functions. These include processes related to digestion, production of certain proteins, and elimination of many of the body's waste products.

Local anesthetic - A medication given by injection into a part of your body to prevent pain in the area without putting you to sleep.

Long-term survivor –A person who is 5 years from the last sign of disease and at least 2 years off therapy.

Low microbial diet - A diet designed to minimize bacteria, viruses, yeast, and molds in food and beverages.

Lubricant - An oily or slippery substance.

Lumbar puncture (LP)/spinal tap - A procedure in which a thin needle is placed in your spinal canal. It's done to remove a small amount of spinal fluid or to give medication through the central nervous system.

Lumen - A tube that forms part of a catheter. Many catheters exit the body and separate into several lumens.

Lymph nodes/glands - An important part of your body in the defense against infections.

Lymphatic system- The tissues and organs that make and store lymphocytes (cells that fight infection) and the channels that carry the lymph fluid. It includes the lymph nodes, spleen, thymus, and bone marrow. The lymphatic system is an important part of your body's immune system. Invasive cancers sometimes enter your lymphatic vessels (channels) and spread to your lymph nodes.

Lymphocytes - A type of white blood cell that helps your body fight infection. There are 3 main types of lymphocytes: (1) T cells that help fight infections such as viruses and fungi; (2) B cells that make proteins called antibodies that help fight infection. For example, if you receive a vaccination against tetanus, you make a protein (antibody) against tetanus; (3) natural killer cells that help fight viruses and other germs. They are sometimes given to help fight cancer.

Lymphocytosis (limf-o-sigh-toe-sis) - Having too many lymphocytes.

Lymphoma (lim-foam-uh) - Cancer of the lymphatic system, a network of thin vessels and nodes throughout the body. Lymphoma involves a type of white blood cell called a lymphocyte. The 2 main types of lymphoma are Hodgkin's disease and non- Hodgkin's lymphoma. The treatment methods for these 2 types of lymphomas are very different.

Magnetic resonance imaging (MRI) - A method of taking pictures of the inside of the body. Instead of using x-rays, MRI uses a powerful magnet and transmits radio waves through the body. The images appear on a computer screen, as well as on film. Like x-rays, the procedure is painless. However, you may find it uncomfortable to be inside the MRI machine.

Malignant tumor (muh-lig-nant) - A mass of cancer cells that may invade surrounding tissues or spread to distant areas of the body.

Metabolism - A general term for the many chemical processes needed for your body to live.

Metastasis (meh-tas-teh-sis) - The spread of cancer cells to distant areas of the body by way of the lymph system or bloodstream.

Microliter - A unit of measure. One millionth of a liter.

Microorganism - A general name for any small living organism, such as bacteria, viruses, and fungi.

Milliliter (mL) - A unit of measure. One thousandths of a liter. There are 30 mL in 1 ounce, 15 mL in 1 tablespoon, and 5 mL in 1 teaspoon.

Mobilization - Taking medication to stimulate the growth of stem cells and move them into the bloodstream.

Monoclonal antibodies - Antibodies made in a laboratory to target substances called antigens. They can be attached to chemotherapy medications or radioactive substances. Monoclonal antibodies are being studied to see if they can seek out antigens unique to cancer cells and deliver treatment directly to the cancer. This would kill the cancer cells without harming healthy tissue. Monoclonal antibodies are also used in other ways, for example, to help find and classify cancer cells.

Mozobil® - A brand of plerixafor. Plerixafor is a medication used together with granulocyte colony-stimulating factor (GCSF) to help move stem cells from the bone marrow to the blood.

Mucositis - Inflammation of the mucous membrane (inside the mouth). It can cause painful mouth sores.

Mucous membrane - A lining of the internal surface of the body that produces mucus.

Myeloma - Cancer of blood plasma cells, a type of white blood cell.

Narcotic - A medication that relieves pain and can make you sleepy.

Nephrologist (nef-rol-o-jist) - A doctor who specializes in diseases of the kidneys.

Neupogen® - A brand of granulocyte colony-stimulating factor (GCSF)—a medication that stimulates the production of neutrophils (a type of white blood cell). Also called filgrastim.

Neurology - The branch of medical science that deals with the nervous system.

Neutropenia - A condition in which there is a lower than normal number of neutrophils (a type of white blood cell) in the body. While you're neutropenic, you'll need to take precautions to prevent infection.

Neutrophils (new-trow-fils) - White blood cells that fight bacterial infection.

Non-Hodgkin's lymphoma - Cancer of the lymphatic system. The difference between non-Hodgkin's lymphoma and Hodgkin's lymphoma is a type of cell called the Reed- Sternberg cell. This cell is only present in Hodgkin's lymphoma. The treatment methods for Hodgkin's and non-Hodgkin's lymphomas are very different.

NPO - Abbreviation for "nothing by mouth."

Nuclear medicine scan - A method for finding diseases of internal organs, such as the brain, liver, or bone. Small amounts of a radioactive substance (isotope) are injected into the bloodstream. The isotope collects in certain organs. A special camera is used to create an image of the organ and detect areas of disease.

Nurse practitioner (NP) - A registered nurse with a master's or doctoral degree. Licensed nurse practitioners diagnose and manage illness and disease and can prescribe medication. They work closely with your doctor.

Oncologist (on-call-o-jist) - A doctor with special training in the diagnosis and treatment of cancer. treatment of cancer.

Ophthalmologist (of-thuh-mal-o-jist) - A medical doctor who specializes in diseases of the eye.

Orally - By mouth; for example, a medication to be taken orally is one that's swallowed.

Organ - Several tissues grouped together to perform one or more functions in the body.

Orthopedic surgeon (or-tho-pe-dik) - A surgeon who specializes in diseases and injuries of the bones.

Osteoporosis - Brittle bones due to the loss of calcium.

Outpatient - A patient who visits a healthcare facility for diagnosis or treatment without spending the night. Sometimes called a day patient.

Packed red blood cell transfusion (PRBC) - A transfusion of red blood cells without the serum.

Palate - The roof of the mouth.

Pancreas - A large gland in the upper part of your abdomen. It secretes enzymes (chemicals) into your intestines for the digestion of food. It makes insulin, which is secreted into your bloodstream.

Pancreatitis - Inflammation (swelling) of your pancreas.

Pancytopenia - The decrease of all blood cells (red, white, and platelets).

Parotid gland - Salivary glands located at the side of your face in front of each ear. These glands become large if you have mumps. Total body irradiation may cause painful swelling of these glands, which is temporary.

Pathology - The branch of medicine involved in making diagnoses from the examination of tissues.

Pedicure - A beauty treatment in which toenails are trimmed/shaped and often polished or painted.

PET scan - A scan used to look at the organs and the way they function in the body. A small amount of radioactive sugar is injected into a vein, and a scanner is used to make detailed, computerized pictures of areas inside the body where the glucose is used. Because cancer cells often use more glucose than normal cells, the pictures can be used to find cancer cells in the body. Also called a positron emission tomography scan.

Petechiae - Tiny, localized hemorrhages from small blood vessels just below the surface of the skin. They are often caused by a low platelet count. They clear up as the platelet count increases.

pH - A symbol that means acidity or alkalinity. A solution of pH 7 is neutral. Below 7 is acidic and above 7 is alkaline. The urine is usually slightly acidic, with a pH of 5.3.

Pharyngitis - Inflammation of the throat; sore throat.

Pharynx - Your throat.

Pheresis/apheresis - A special method of collecting blood when only one part of the blood is needed.

Phlebitis - Inflammation of a vein. Signs include pain, swelling, and tenderness in an area. If a superficial vein is involved, the phlebitis can be felt as a cord-like thickening along the vein.

Physician assistant (PA) - A licensed medical professional who practices medicine under physician supervision. Physician assistants diagnose and manage illness and prescribe medications.

Plasma - The liquid portion of the blood in which blood cells are suspended. It contains many proteins and minerals necessary for normal body function.

Platelet - A part of the blood that helps repair (plug) holes in blood vessels after an injury. If you have a low platelet count, you're at risk for bleeding. Chemotherapy can cause a drop in the platelet count. This is called thrombocytopenia.

Plerixafor - A medication used together with granulocyte colony-stimulating factor (G-CSF) to move stem cells from the bone marrow to the bloodstream.

Pneumonia - Infection of the lung.

Polys (neutrophils or granulocytes) - The group of white cells that helps to resist bacterial infection. A "poly" count of less than 1,000 means that you have an increased risk of infection.

Postop - After surgery.

Potassium - An element found normally in your blood; it's important for heart and muscle function.

Preop - Before surgery.

Prognosis (prog-no-sis) - A prediction of the course of disease; the outlook for a cure. A prognosis is based on the average result in many cases. It may not accurately predict your outcome, since the course can vary from patient to patient.

Prophylactic - Treatment designed to prevent a disease or a complication that hasn't yet become clear.

Protocol (pro-teh-call) - A formal outline or plan, such as a description of what treatments you'll receive and exactly when each should be given.

Pulmonary - Concerns or affects your lungs.

Pulmonary fibrosis - Thickened tissue in your lungs that causes coughing, difficulty breathing, and x-ray changes.

Pulmonary function tests (PFTs) - Special tests that are designed to evaluate the function of your lungs.

Radiation oncologist - A doctor who specializes in using radiation to treat cancer.

Radiation recall - Inflammation (swelling) of exposed skin and organs in areas of radiation therapy.

Radiation therapy - Treatment with high-energy x-rays to kill cancer cells or shrink tumors. The radiation can come from outside of the body (external radiation) or from radioactive materials placed directly in the tumor (internal or implant radiation). Radiation therapy can be used to reduce the size of a tumor before surgery or to destroy any remaining cancer cells after surgery. Or, in some cases, it may be the main treatment.

Rectal - By or having to do with the rectum. The rectum is the last several inches of your large intestine closest to your anus.

Rectum - The last part of your large intestine.

Red blood cell - A cell that carries oxygen to all parts of the body. Also called erythrocyte and RBC.

Regression - The reduction of cancer, usually as the result of therapy. It's shown by the decreased size of the tumor or tumors.

Reinduction - To start over, such as, a new treatment or protocol.

Rejection - The body's inability to accept transplanted stem cells.

Relapse - Return of cancer after a disease-free period.

Remission - When the signs and symptoms of cancer fully or partly disappear. The period during which a disease is under control. A remission may not be a cure.

Renal - Pertaining to your kidneys.

Resident - A physician in the second or third year of training after completing medical school.

Resistance - Your ability to fight off and avoid disease.

Respiration - The process of breathing.

Respiratory tract - All parts of your body used for breathing.

Scan - A study using either x-rays or radioactive isotopes to create images of internal body organs.

Sedative - A medication given to make you drowsy or sleepy.

Sedimentation rate (SED) - The change in speed of the red blood cell count expressed in millimeters per hour. A SED rate that's over 25 or is increasing may indicate infection.

Septicemia/sepsis - A very serious bacterial or fungal blood infection. It usually spreads from another site of infection such as skin, bowel, or urinary tract. It can cause high fever, shaking chills, and heavy sweating. It's more likely to happen in patients with a very low white blood cell count.

Shingles (herpes zoster) - A viral infection of the nerve endings in the skin. It can cause blisters, crusting, and severe pain along the nerve. It's the same virus that causes chicken pox. Children who haven't had chicken pox may get it from contact with someone who has shingles.

Simulation – A procedure that’s done to plan radiation therapy; measurements and x-rays are taken and actual radiation treatment fields are determined.

Sinuses - Hollow spaces in the bones of your head.

Spinal cord - The cord or nerve tissue that runs through the center of your spinal column. It connects your brain to other parts of your body.

Spleen - An organ that filters your blood. It removes debris and old or dying cells from circulation. It also removes bacteria from the blood during the early stages of severe infection. It often becomes enlarged in those with leukemia and certain other diseases.

Stem cells - Primitive blood-forming cells in the bone marrow that give rise to white blood cells, red blood cells, and platelets.

Sternum- The long, flat bone that forms the center front of your chest wall. Your breastbone is attached to the collarbone and your first 7 ribs. Also called the breastbone.

Stomatitis - Mouth sores; this can be a side effect of some kinds of chemotherapy.

Suppository (rectal or vaginal) - A medication prepared for insertion into the anus or vagina, where it’s generally absorbed into the bloodstream.

Susceptible - Tendency to develop a disease if exposed to it; not having immunity.

Symptom - A change or sign in the body or its function that indicates disease or infection.

T cell-depleted blood stem cell transplant - A type of transplant in which T cells are removed in a laboratory after donor stem cells are obtained. This process reduces the likelihood of graft versus host disease that’s caused by the donor’s T cells.

T cell or T lymphocyte - A type of white blood cell or lymphocyte that plays a major role in the body’s defense against viral and fungal infections.

Testicular mass - A swelling of the testis or testicle, the male reproductive gland.

Thrombocytopenia (throm-bo-sigh-toe-peen-e-uh) - A decrease in the number of platelets in your blood.

Thrombophlebitis - An inflammation of a vein.

Tinnitus - Ringing in your ears.

Tissue - A collection of cells similar in structure and function.

Tissue typing (human leukocyte antigen, HLA) - A special test of white blood cells to check the genetic match between a donor and the patient.

Total body irradiation (TBI) - Radiation treatments given to the whole body.

Total lymphoid irradiation (TLI) - Radiation treatments given to the parts of the body where most of the lymphatic system is located.

Toxicity - A word used to describe the side effects caused by a medication.

Toxins - Poisonous substances; may be produced by germs.

Trachea - Your windpipe.

Transfusion - A procedure in which a person is given an infusion of whole blood or parts of blood, such as red blood cells or platelets. The blood may be donated by another person or it may have been taken from the patient earlier and stored until needed. Also called a blood transfusion.

Transfusion reaction - An allergic response to blood products. Symptoms include hives, chills, or headaches ranging from mild to severe.

Tumor - An abnormal lump or mass of tissue. Tumors can be benign (not cancerous) or malignant (cancerous).

Ulcer - A wearing away of normal tissues. It can be from corrosive chemicals (for example, acids), infection, impaired circulation, or cancer. It can cause bleeding.

Ultrasound - An imaging method that uses sound waves to outline a part of your body. It can be done to any part of the body. A tumor or infection can be monitored this way.

Unpasteurized - Relating to perishable food that hasn't been pasteurized (heat treated to kill potentially harmful microbes).

Urinalysis - The process by which your urine is examined for various factors.

Urinary tract - The organs that have to do with the production and elimination of urine, such as, kidneys, bladder, ureters, and urethra.

Varicella - Chicken pox, an infection caused by a virus. Children with cancer may have a problem with this infection if they haven't had it before.

Vein - A blood vessel carrying blood from your tissues towards your heart and lungs. Veins are used to draw blood samples and administer IV liquids because blood in veins is not under pressure.

Veno-occlusive disease (VOD) - A disease caused by a blockage in the flow of blood in the liver. It results in weight gain, an enlarged liver, and yellowing of the skin. It can cause mild, moderate, or severe liver damage or death.

Vertigo - Dizziness, especially the feeling that your surroundings are swirling.

Virus - A small germ that may cause infection, such as measles, mumps, chicken pox, and the common cold.

White blood cells (WBC) – The cells in your blood that are most important in fighting infection. Examples are neutrophils, or “polys”, and lymphocytes, or “lymphs.”

X-ray - A form of radiation that can be used at low levels to produce an image of the body on film. It can be used at high levels to destroy cancer cells.

Zoster - varicella zoster - See shingles.