Our Mission

To improve the health of the community we serve. We focus on our core values: excellence, accountability, compassion, integrity, respect, and teamwork.
Dear Patient,

We are a team committed to providing you with outstanding health care. You and your family will be meeting with our team of dedicated professionals. Together, we will work to help you and your family understand the medical, emotional and financial aspects of your treatment.

This handbook will provide information related to the transplant process and the role of your team members. The decision to pursue transplantation can be overwhelming, but be assured our team will assist you through all the stages of stem cell transplant. Meeting with your doctor, members of the transplant team, and reading through this handbook, will assist you in making decisions related to your care.

We encourage you to use the information provided in this book as a guide when you talk to members of the transplant team. If you and your doctor decide a transplant is the best plan of care for you, the Spectrum Health Blood and Marrow Transplant Program team is here to support you through your journey.

Sincerely,

The Staff of Spectrum Health Blood and Marrow Transplant Program
Your Transplant Team

**Adult BMT Physicians**
The transplant physicians have many years of advanced training and experience in blood and marrow transplants. Your transplant physician will direct your care throughout the phases of transplant with other members of the BMT Team.

**Advanced Practice Providers (APPs)**
Physician assistants (PA) and nurse practitioners (NP) are a part of Spectrum Health’s Advanced Practice Provider (APP) staff. They have advanced training in stem cell transplant and are responsible for your day-to-day care while you are in the hospital and clinic. They work under the direct supervision of the transplant physician.

**Pharmacists**
Pharmacists monitor the medications you receive throughout the transplant process. They assist with the scheduling, preparing, and dispensing of all medications, including chemotherapy regimens. The pharmacists are available in the inpatient and outpatient areas and will provide education on the proper use of all of your medications.

**Transplant Coordinators**
Transplant coordinators initiate the steps leading to transplant. These specially trained nurses will arrange tests, evaluations and treatments to determine eligibility for transplantation. They provide education, answer questions, and plan the stem cell collection schedule. Transplant coordinators serve as your main contact heading to transplant.

**Licensed Practical Nurses**
Licensed Practical Nurses (LPNs) provide support in the BMT outpatient clinic. The LPNs triage patient phone calls and assist with prescription refills.

**BMT Infusion Nurses**
These specially trained nurses work in the BMT outpatient clinic. They develop nursing care plans appropriate to monitor patient status, administer needed medications, and provide relevant education.

**Social Workers**
Transplant Clinical Social Workers provide services that are essential to improving patient outcomes. Social workers serve and provide resources and facilitate communication between you and the team. They conduct assessments and high risk screening of patients
to evaluate the impact of treatment. Social Workers provide emotional support, counseling and pain management interventions. They help with discharge planning and navigation through the health care system.

**Financial Coordinators**

Financial Coordinators will meet with you to discuss insurance coverage and out of pocket expenses. They are also available to assist with billing questions, insurance coverage changes, and prior authorizations.

**Inpatient Nurses**

Inpatient nursing staff is trained in the care and special needs of BMT patients. They will assess symptoms, communicate with the physician/APP, administer medications, and assist with daily needs.

**Dietitians**

Dietitians are certified in cancer nutrition and will work closely with you and your caregiver to set nutritional goals. A registered dietitian will meet with you throughout the transplant process.

**Michigan Blood**

Michigan Blood is an independent, nonprofit blood bank contracted by Spectrum Health and is utilized for the purpose of stem cell collection and storage. They perform stem cell collection (apheresis) procedures and photopheresis treatments.

**Physical/Occupational Therapists**

Physical therapy team will monitor your strength and endurance during your hospital stay. They will assist you in developing an exercise plan. If rehabilitation is needed after your hospital stay, the physical therapist will share your needs with the rehab facility.

**Care Management Specialists**

A care management specialist will be assigned to you during your stay in the hospital. They will fully coordinate healthcare services needed after discharge.

**Chaplains**

Chaplains are available 24 hours a day to help you cope with stress of transplant. You may request a chaplain from any member of your transplant team.
Understanding Transplantation

The Role of Bone Marrow

Bone marrow is the soft tissue inside bones that produces blood cells. Examples of blood cells are red blood cells, white blood cells, and platelets.

- Red blood cells carry oxygen through the body.
- White blood cells help fight infections.
- Platelets help stop bleeding.

Healthy bone marrow and blood cells are required to live. Life-threatening problems can happen if there is a change in your marrow from a disease or if your marrow is damaged.

Blood and marrow stem cell transplants treat many diseases in both children and adults. In a blood and marrow transplant, healthy stem cells are given to replace the damaged bone marrow.

Damaged bone marrow can be caused by:

- Bone Marrow Failure
- Destruction of marrow by a disease
- Chemotherapy and radiation

Why do I need a transplant?

If you have a blood disease or if your bone marrow is failing, a transplant can help you by replacing your damaged stem cells with healthy ones.

Individuals with the following diagnoses may benefit from a stem cell transplant:

- Aplastic Anemia
- Multiple Myeloma
- Hodgkin’s Disease
- Lymphoma
- Leukemia
- Pediatric solid tumors (Neuroblastoma)
- Immune System Diseases
- Myelodysplastic Syndrome
- Sickle Cell Disease
- Testicular cancer
Collection of Stem Cells

The terms “collecting” and “harvesting” stem cells are the same. You will likely hear both of these terms used. Your doctor will tell you the best way to collect stem cells for your transplant. Depending on your disease, you may need stem cells from a donor or you may actually be your own donor.

We can collect stem cells from three different sources:

1. **Peripheral (circulating) blood collection:** Blood is taken directly from a vein in the donor’s arm or neck through a process called apheresis.

2. **Bone marrow harvest:** Marrow is taken from the pelvic bone. This procedure is done in the hospital under anesthesia.

3. **Umbilical cord harvest:** Blood taken directly from the umbilical cord after a baby is born in the hospital.

Types of Transplant

Your doctor will discuss which type of transplant is best for you. There are two basic types of transplants:

1. **Autologous:** You donate your own stem cells.

2. **Allogeneic:** You receive stem cells from a donor who may or may not be related to you.
   
   a. **Related (family) donor:** Human Leukocyte Antigen (HLA) tissue typing is done on certain relatives to see if they would be a match for you.

   b. **Unrelated:** A donor is found in a worldwide registry participating in the National Marrow Donor Program (NMDP)- Be The Match.

   c. **Syngeneic:** The donor is an identical twin.

   d. **Haploidentical:** The related donor’s HLA testing is a half-match to the patient.

Phases of Transplant

- **Pre-Transplant Evaluation**
- **Testing**
- **Collection of Stem Cells**
- **Chemotherapy +/- radiation**
- **Stem Cell Transplant**
- **Recovery**
Pre-Transplant

Health Care Durable Power of Attorney
A durable power of attorney (DPOA) for healthcare is a legal form specifying the person you trust to make medical decisions for you if you are unable to do so.

Our social worker can provide you with the form if you do not have a DPOA.

Insurance
Understanding costs and insurance benefits for transplant services can be difficult. Our knowledgeable financial coordinators will help verify your insurance coverage and identify any gaps or limits in your coverage.

Nutrition
Before your transplant, eat a healthy diet. In the time leading up to your transplant, do not diet to lose weight.

Exercise
Daily exercise is beneficial to staying healthy and building strength. You should never be in pain during or after your exercise.

Smoking
If you smoke (i.e. cigarettes, pipe, cigars, and e-cigarettes), you are strongly encouraged to quit. Please avoid secondhand smoke. Smoking is prohibited on hospital property and you will not be permitted to leave the unit to smoke.

Personal Care
Before admission you will need to:

- Perform nail care:
  - Trim your fingernails and toenails
  - Remove any fake nails
  - Remove all nail polish
- Shave off your beard or mustache (optional)
- Consider cutting your hair short (optional)
Fertility Counseling
Talk to your physician about having children in the future. Your transplant doctor, nurse coordinator, or social worker can assist with referral to a fertility specialist to discuss with you your options related to egg preservation or sperm banking.

Emotional Support
Common feelings during the transplant process include: stress, fear, anger, and guilt. Spectrum Health and the BMT team have resources to support you including social workers, a psychiatrist, and a psychologist.

Lodging
Lodging arrangements may be necessary if you live more than 30 miles from Spectrum Health Butterworth campus. Our patients and their caregivers may stay at Hope Lodge or Renucci Hospitality House for routine clinic visits requiring overnight stay. Allogeneic transplant patients may need to stay close to the outpatient BMT clinic for a period of time after discharge from the hospital. Space is limited. Let our social worker know if you need assistance in securing lodging.

CarePages or CaringBridge
Developing a CarePage or CaringBridge is a good way to inform family and friends or your health status. CarePages is a free and private website. The web site address is www.carepages.com or www.caringbridge.org. If you would like to know more about this service, our social worker can help you get started.
Choosing a Caregiver

Caregiver(s) should be identified prior to transplant. Allogeneic transplant patients are required to name a caregiver and have a signed Caregiver Agreement. Autologous patients do not require a caregiver but it is encouraged to assist you post-transplant.

A caregiver does not require formal medical or nurse training but should be willing to learn basic skills. Your caregiver should be readily available to you at any time. The caregiver will be a strong advocate for you and can support your health care choices.

For many people, the natural choice is a spouse, a parent or a partner. It is important that both you and your caregiver(s) understand the role. If you do not have someone to care for you full-time, consider asking others to share the responsibilities. For ideas on how to organize a caregiving team, visit www.sharethecare.org.
Admission

For your transplant, you will be admitted to the Spectrum Health Lettinga Cancer Center, located on the 5th floor of Butterworth Hospital:

100 Michigan Street NE
Grand Rapids, MI 49503

Packing for admission

The transplant team encourages you to bring a few personal items to help you feel comfortable during your hospital stay. Please bring one medium sized bag or suitcase. You will have a small closet and shelf for storage. Check with your nurse coordinator or social worker if you have questions about items not listed below.

Items everyone should bring:

- One (1) copy of your Medical Durable Power of Attorney (DPOA)
- Blood and Marrow Transplant Patient Handbook

<table>
<thead>
<tr>
<th>Items to Bring</th>
<th>Items to Leave at Home</th>
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<tbody>
<tr>
<td>• Clothes and undergarments to change daily (tops</td>
<td>• Valuables</td>
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<td>that open in the front are preferred for easy</td>
<td>• Fingernail clippers</td>
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<td>central line access)</td>
<td>• Contact lenses</td>
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<tr>
<td>• Short-sleeve shirts for central lines in the</td>
<td>• Dental floss</td>
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<tr>
<td>arm (PICC lines)</td>
<td>• Cologne/perfume</td>
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<td>• Bathrobe that opens down the front</td>
<td>• Fake or real plants/flowers</td>
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<td>• Slippers/socks with non-skid bottoms</td>
<td>• Small appliances</td>
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<tr>
<td>• Turbans, scarves or hats</td>
<td>• Non-shelf stable food</td>
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<td>• Pillows (no feather) and blankets must be</td>
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<td>machine washed.</td>
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<td>• Electric razors only</td>
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<td>• SOFT toothbrush and holder</td>
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<tr>
<td>• Menstrual pads (no tampons)</td>
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<tr>
<td>• Cell phone/charger, books, and games</td>
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<td>• Laptop/Tablet</td>
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Visiting Guidelines

• Visiting hours are flexible. We encourage families and caregivers to use this time to get their own much-needed rest.
• The number of visitors is limited to no more than 5 at a time.
• Visitors may NOT use the bathroom in the patient’s room.
• Visitors need to hang coats in locker located outside of the unit.
• All visitors must be healthy.
• No visitors or family members may visit if they are sick.
• All visitors must check in with the unit secretary prior to entering the unit to verify they are healthy and will not pass illness to patients.
• All visitors younger than 12 are not allowed in the patient room without prior doctor approval.
• All visitors must wash their hands upon entry to the patient’s room.
• Visitors have several dining options available at Spectrum Health:
  - Prisms cafeteria (Open 24 hours a day, 7 days a week).
  - Mehney Terrace Bistro (Open Monday – Friday 6:30AM – 4:00PM)
  - Fireside Grill (Open Monday – Friday 10:30AM – 3PM)
  - Balk Café (Open Monday – Friday 11AM – 7 PM)
• For a fee of $8 (subject to change), your visitor(s) may eat in your room with you. Credit card is required for payment.
• Visitors may bring in food from home. It must be labeled and stored in the guest fridge.

Patient and Family Correspondence

You can receive mail during your hospital stay by using the address below. It is important to include your room number and hospital unit in the mailing address. Write the word “patient” in the lower left-hand corner of the envelope for quick delivery.

Patient Name  
Spectrum Health Butterworth Hospital  
Bone Marrow Transplant Unit  
Patient Room #  
100 Michigan St. NE Mail Code 118  
Grand Rapids, MI 49503
Your Hospitalization

Your Hospital Room
All transplant patients will have a private room and will remain on the unit until discharge.

Each room is equipped with:
• Bathroom with shower
• Bedside table
• Small closet
• Television with cable
• Wireless internet access
• Couch and chairs

Telephone Service
There is no fee for local calls using patient telephones. Long-distance calls must be made collect or billed to a credit card. Cell phones may be used in the room.

Internet Access
Internet access is available using our free wireless (Wi-Fi) guest network.

Meals
Meals may be ordered via our menu and will be delivered to your room between 7 a.m. and 7 p.m.

Massage Therapy Services
Complimentary massage is available upon request. Ask a member of the nursing staff if you would like to use this service.

Hospital Smoking and Substance Use Policy
Spectrum Health has a no smoking policy. This includes e-cigarettes. Spectrum Health does not permit the use of alcohol and/or illicit drugs due to potential serious interactions with your treatment.
What to expect when in the hospital

Vital Signs and Labs
• Vitals will be taken every 4 hours at 10, 2, and 6 (both AM and PM).
• Daily standing weight is required every morning, at the 2:00 AM or 6:00 AM vitals.
• Labs will be drawn between 3:00AM and 6:00AM daily from your central line; twice a week you may have blood drawn from a vein, instead of your central line. (Lab draw times are approximate).
• Staff will perform visual checks (checking in on you) every hour throughout the day and night.
• Swabbing of your nose and rectum for a contagious infection occurs on admission.

Documentation
• Save all urine, stool and vomit in the appropriate containers (“hats”).
• All drink containers need to be saved until documented by a staff member, please place empty cups or containers on the countertop or bedside table.

Activity
• Use the incentive spirometer 10 times every hour when you are awake.
• It is expected that you walk at least 4 times per day in the hallway.
• To keep you safe, staff members will stay in the bathroom with you as needed to prevent you from falling.

Infection Prevention
• Daily showering and linen/clothes change are expected.
  # Chlorhexidine wash assists with minimizing infectious agents on your skin that may cause infection when your immune system is compromised.
• Mouth rinses are to be done at least 4 times per day and tooth brushing should be done 3 times per day. This is very important in preventing infections.
• Your room should remain clean and free of clutter. Please dispose of empty containers and unused materials in the trash can.
• Hand washing is important for you, staff, and visitors. All visitors and staff must sanitize or wash their hands prior to entering your room. Remember to wash your hands after using the bathroom and before meals.
• A mask should be worn when out of your hospital room.
• Family members and visitors will be expected to store their things (i.e. coats, purses, bags) in the BMT lockers outside of the unit.
• Limit the number of belongings in your room (i.e. excessive luggage and bags).
• Inform the RN if the central line dressing is not secure.
• A green cap should be on every hub of your central line.
• Fresh-cut flowers/plants, dried flowers and fake/silk are not allowed on the unit. Flowers may carry germs in water, leaves or soil.
• You must remain on the unit once admitted. Our unit is HEPA filtered and rooms have positive pressure to help decrease your risk of exposure to germs.
Autologous Transplant

The autologous transplant involves collecting, processing, and freezing your own stem cells. The cells are collected from your bloodstream. High doses of chemotherapy, with or without radiation, are used to kill any cancer cells in your body. After your treatment regimen is completed, your collected stem cells will be infused back into your bloodstream. The stem cells find their way to your bone marrow and begin to grow into healthy, mature cells. The goal of the autologous transplant is remission and potentially the cure of your disease.

Getting ready for transplant may be a challenging time. Preparation may take weeks or even months. This timeframe will depend on your diagnosis, response to treatment, disease status, and your test results.

Initial Consult

You will meet with your transplant physician, Advanced Practice Physician (APP) and your transplant coordinator during your first appointment at the Bone Marrow Transplant Outpatient Clinic. This appointment will help you make the best decisions in your care, including if transplant is the right treatment option for you. What to expect during your first visit:

- Review of your medical history
- Physical exam
- Labs
- Education on the transplant process
Testing & Appointments

The transplant team will schedule lab work and tests to evaluate your health. You may be referred to different doctors who will ensure you are healthy for transplant. Some test examples include, but are not limited to:

<table>
<thead>
<tr>
<th>Tests</th>
<th>Consultations</th>
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<tbody>
<tr>
<td>Bone Marrow Biopsy</td>
<td>Cardiology</td>
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<tr>
<td>CT/PET scan</td>
<td>Physical therapy</td>
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<tr>
<td>Labs</td>
<td>Registered Dietitian</td>
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<tr>
<td>Echocardiogram</td>
<td>Social Work</td>
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<tr>
<td>EKG</td>
<td>Radiation Oncology</td>
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<td>Pulmonary function test</td>
<td>Allergy/Immunology</td>
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<td>Chest X-ray</td>
<td>Dentist</td>
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<td>24-hour urine collection</td>
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<td>Urinalysis</td>
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<td>Infectious Disease</td>
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Dental Exam

Any dental concerns must be checked out before your transplant. This dental clearance will help prevent any infection after transplant from the mouth or teeth.

Eligibility

Your transplant doctor will review your lab and test results with you. Based on these results, the doctor will discuss whether or not you are able to have a transplant.

Caregiver Plan

Identifying a caregiver is recommended for your transplant. The caregiver’s role is to provide support and help after your transplant. Our social worker can help you make a caregiver plan. See the “Choosing a Caregiver” section.
Mobilization

The first step in the collection process is Mobilization. Mobilization is the process of moving stem cells out of the bone marrow and into the blood stream. Chemotherapy and colony stimulating factors are used together or separately in this process.

Filgrastim products are colony stimulating factors used to move stem cells out of the bone marrow and into the blood stream. The stem cells are then collected by a procedure called apheresis. These medications are given by subcutaneous injection, or shot under the skin, once daily. The first injection will be given in the BMT outpatient clinic. Your BMT nurse will teach you how to give yourself the rest of the doses at home. Sometimes insurance requires that these injections are given only in our clinic. This medication will continue until enough stem cells have been collected. Lab values will help us determine when the apheresis procedure may begin.

Collection

Stem cells can be collected surgically from your bone marrow or more commonly peripherally with an IV via apheresis. Collection from your bone marrow happens in the operating room and requires anesthesia. Collection from peripheral veins through apheresis happens in the BMT Outpatient Clinic office and does not require anesthesia.

Apheresis

Apheresis is the process of collecting stem cells from the blood stream. An IV catheter is placed in a vein of your neck or chest by an interventional radiologist physician. The IV catheter may remain until after the transplant.

Blood is removed and returned through the tubes of your IV catheter. The apheresis machine filters the stem cells out of your blood and the remaining blood is returned to your body.

After collection, the stem cells are brought to our processing facility for freezing and storage until transplant day.

The apheresis procedure may take 6-8 hours to complete and may take 1-3 days to collect the desired number of cells.
Preparing for Stem Cell Collection

Generally, stem cell collection is done in the outpatient BMT clinic located on the 5th floor of Lemmen-Holton Cancer Pavilion. Stem cell collection tips:

- **Injection.** Give yourself the Filgrastim product shot at home before you leave for your apheresis procedure.

- **Labs.** Labs will be drawn when you arrive and at the end of each collection day. Your procedure plan is completely dependent on your lab results. Your health care team cannot tell you a concrete plan until your lab results are received.

- **Medications.** Tell your nurse what medicines you have with you, if any. Bring any daily medicines to the apheresis procedure. You can take the medicines as you usually do.

- **Potassium and Magnesium Tablets.** Bring the potassium and magnesium tablets that were prescribed to you for the apheresis procedure. Your health care team will tell you if and when you need to take them.

- **Length of Collection.** The length of the procedure can be up to 8 hours and may take more than one day. The amount of stem cells collected will not be known until early in the evening after the procedure. You may need to stay in the clinic until we know if you need to return the next day or not.

- **Visitors.** You can have 1 or 2 visitors with you during your procedure. There is a limit of 2 visitors at all times during your procedure because the treatment space is small.

- **Food.** It is important for you to eat before and throughout the day during your procedure. You may bring your own food and drinks. A microwave and refrigerator are available for your use. Food may also be purchased at Lemmen-Holton or the hospital. If you plan on purchasing food, it would be helpful to have someone with you to get your food because you will not be able to move about freely. Coffee and water are available in the treatment area.

- **Clothing.** A shirt that buttons in the front or has a large neck opening is best. Your health care team will need easy access to the catheter in your neck or chest for the procedure. It can be cool in the treatment area. You may want to wear layers that can be removed easily, like a cardigan or full zip fleece or full zip sweatshirt. You will not be able to pull layered clothing over your head to remove.

- **Entertainment.** The procedure can be as long as 8 hours. You may bring something to read or your computer to use during the day. Free Wi-Fi is available. There is also a TV available.

- **Restroom.** You will be connected to the apheresis machine throughout the procedure and will not be able to use the bathroom as you normally would. A commode can be brought into your treatment room or men can stand to use a urinal. You will be given as much privacy as possible while keeping you and your stem cells safe.
Transplant & Recovery

The next sections give you details about the transplant process and recovery.
Transplant Pathway

Admit & Line Placement
On your admission day, you may have a new IV line placed prior to arriving on the unit.

- The IV line is called a peripherally inserted cutaneous catheter (PICC).
- It will be placed by an interventional radiologist.
- The PICC will be used for IV fluids, antibiotics, chemotherapy, lab draws and transfusions. If you already have a Port-a-Cath in your chest, you will still need another IV catheter for transplant.

After the new IV is placed, you will be taken to the transplant unit for admission.

Conditioning
The purpose of the conditioning regimen is to:

- Kill any remaining cancer cells
- Prepare the bone marrow for acceptance of the new stem cells.

The conditioning regimen includes chemotherapy and possibly radiation therapy depending on the type of transplant you are receiving. Your physician will discuss the plan with you prior to your admission.

Side Effects
Side effects of the conditioning regimen are similar to what you may have experienced with your past chemotherapy treatments. This includes: mouth sores, nausea, vomiting, diarrhea, hair loss, and lowering of blood counts. Your blood counts will be monitored by your BMT team. The use of strict infection prevention measures will be necessary and blood transfusions may be required.

Conditioning chemotherapy may also impact the function of your kidneys, liver, heart and lungs. Your transplant physician and APPs will monitor your lab results daily and intervene as necessary.
Types of Conditioning Regimens

- **Myeloablative**: High doses of chemotherapy with or without radiation are used with this regimen, with the goal of complete “clearing” of your bone marrow.

- **Non-Myeloablative**: The dose of conditioning drugs and radiation is reduced. This type of regimen could be an option for adult patients in higher age group or patients with multiple medical problems/risk factors and is dependent upon diagnosis.

A reduced-intensity protocol includes a regimen that does not meet the criteria for either myeloablative or non-myeloablative protocols.

- **Radiation**: Radiation therapy may be included with your conditioning regimen. There are three types of radiation that can be given:
  - **Total body irradiation (TBI)**
  - **Total lymphoid irradiation**: Targeting major lymph node areas.
  - **Boost radiation**: Targeting a particular body part.

If your conditioning regimen includes radiation, an appointment will be scheduled with a radiation oncologist to discuss this treatment. Radiation treatment may be started prior to hospital admission or during your hospital stay. The procedure usually takes 30-60 minutes once or twice daily depending on your conditioning regimen. Your BMT physician will determine the most appropriate conditioning regimen for you.

**Day (-) versus Day (+)**

The Day (-) and (+) days are how the BMT team will identify the stage of transplant. Day (-) days are associated with the administration of chemotherapy prior to transplant. Day (+) days are associated with the days after your transplant. Transplant day is classified as Day (0).
**Stem Cell Transplant**

Premedication is given prior to transplant and includes Benadryl® (diphenhydramine) and Tylenol® (acetaminophen) to prevent any infusion reactions. Monitoring will include frequent vital signs prior, during, and after the transplant.

The stem cell transplant is similar to a blood transfusion. The transplant will be performed in your hospital room by members of your transplant team. The stem cells will be brought to your room by Michigan Blood nursing staff. Each bag takes approximately 20 minutes to infuse.

Stem cells may be fresh or frozen. Frozen stem cells will be thawed in your room prior to infusion. Frozen stem cells include dimethyl sulfoxide (DMSO), which is a preservative used to protect the stem cells during the freezing and thawing process.

- **DMSO side effects:**
  - Chills, fever and skin rash.
  - Garlic-like taste in your mouth and odor in your room for 2-3 days after transplant.

- **Transplant side effects:**
  - Rare: allergic reactions, itchiness, shortness of breath, wheezing, and stomach pains.
  - Pink urine for a day or two. (This side effect is due to the elimination of red blood cells that may have been included in your stem cell product).

**Recovery & Engraftment**

**Recovery**

Side effects from the conditioning (chemotherapy) regimen will still be present for a number of days after the transplant.

- **Blood tests:** Blood tests may be drawn daily and results will be posted on the whiteboard in your room. At this time, you are at risk for infection, electrolyte imbalance and blood deficiencies.
  - Low white blood cell count increases risk of infection.
  - Low calcium, potassium, or magnesium requiring supplementation.
  - Low red blood cells and platelets may require transfusion.

- **Nutrition:** Food has a vital role in helping you get the best result from your treatment. The dietitian will visit daily to identify appropriate diet modifications if you are having difficulty eating.
Hygiene: Good mouth care is required several times a day before and after transplant to assist with prevention of infections. If you are having difficulty with mouth care due to mouth sores, there are alternative methods to achieve this goal. Showering is expected to be done every day using Chlorhexidine (CHG) soap, provided to you upon admission to the hospital. This special soap kills bacteria on your skin providing another tool to assist with infection prevention. Hand washing is expected after using the bathroom, after touching sores on your body, and before performing mouth care.

Activity: Remaining active is important to your recovery. It is expected that all patients walk in the hallway 4 times daily. For those who prefer another form of exercise, exercise bikes and weights are available in the 5 center exercise room. A physical therapist can also assist you with exercise goals during your hospital stay.

Engraftment

Engraftment is a term used to describe the growth of the new stem cells within your bone marrow. Filgrastim products are subcutaneous injections and will be given post-transplant to assist with the engraftment and growth of stem cells. Approximately 10 – 14 days after your transplant, your bone marrow should show signs of engraftment. Your care team will monitor your daily lab values looking for a neutrophil count of greater than 500 for three consecutive days to determine engraftment.

Discharge

Recovery varies among patients. Below are a few goals that need to be met before discharge:

- Absence of fever.
- Absence/control of Infection and graft versus host disease (GVHD). See “Potential Complications” on page 33 for more information.
- Acceptable white blood cell count.
- Improved appetite.
- Able to take oral medications.
- Mouth sores and diarrhea are controlled.
After Your Transplant

Your care continues after transplant. Full recovery of your immune system will take at least 6-12 months or longer if you develop GVHD or other complications. Blood and platelet transfusions may continue post-transplant. You may be sent home with your IV line still in place. Labs will be checked at least once a week by your home health care or BMT clinic nurses.

Precautions

Precautions are necessary to prevent infections and bleeding during recovery. There are precautions that should be taken to prevent infections and bleeding during recovery. The following are recommended actions to take to limit your risk for infections or bleeding.

Preparing Your House

- Clean inside of your car prior to discharging home.
- Thoroughly clean your home prior to your return.
- Steam clean your carpets (preferred over dry powder chemical cleaning).
- Wash curtains and blinds.
- Clean all kitchen and bathroom surfaces with household cleaner containing bleach.
- Bleach shower heads.
- Change furnace filters.
- Dust and vacuum weekly.
- Wash bed linens weekly.
Handwashing

Handwashing is the single most important infection prevention measure! Use soap and water or alcohol-based hand gel. Remember to rub hands together for a full 20 seconds. Hands should be washed after going to the bathroom, before and after eating, and activities.

Mask

For allogeneic transplant patients, a mask should be worn in public for at least the first 100 days. A mask should be worn to your doctor appointments.

People and Places

- Avoid contact with anyone who is sick.
- Avoid large crowds for the first 6 months following discharge.
- Avoid exposure to communicable and/or childhood diseases (i.e. chicken pox, shingles, measles).
- Avoid contact with children who have recently had a “live” vaccine immunization (i.e. nasal flu mist, measles, mumps, rubella (MMR), and chickenpox).
- Avoid dust and mold (i.e. construction areas, remodeling areas, vacuum cleaner bags, etc.).
- Avoid lung irritants (i.e. aerosol spray cans, smoke-filled areas, secondhand smoke, and wood burning fireplaces).
- Caregivers and family members should receive the injectable flu vaccine.
Pets and Animals

- Household pets can stay in the home, except for birds and reptiles. Avoid scratches and bites.
- Do not purchase any new pets.
- Make sure pet is up to date with shots.
- Wash hands after touching your pet.
- Avoid animal waste.
- Family should clean cages and litter boxes daily.
- Avoid kissing and hugging your pet.
- Pets should not sleep with you.
- Avoid close contact with other pets and outdoor animals including reptiles and exotic pets.

Plants and Flowers

Remove all plants and flowers from your home. Avoid gardening, mowing the lawn and other activities that stir up soil. Fake plants and silk flowers should be removed from the home; they attract dust.

Travel

Inform your BMT doctor of any travel plans. Carry your medical history information along with your list of medications.

- Avoid swimming in lakes, public pools, and hot tubs.
- Use sun protection while outdoors such as sunglasses, lotion with at least SPF 30, and a hat.

Sexual Activity

A decrease in sexual drive is normal after a transplant. Sexual activity may occur after your blood counts are normal and you feel ready.

Your partner must be healthy and a latex condom should be used for 6 months after transplant and during periods of profound immunosuppression. Pregnancy should be avoided at this time. Staying with one partner will lessen the risk of getting infected with a sexually transmitted disease.

Women experiencing menopausal symptoms may need hormone placement therapy. For women experiencing vaginal dryness, a water-based lubricant may be used.

Men may experience temporary erectile dysfunction, which should return with time. If you are experiencing symptoms for a long period of time, inform your physician. Please refrain from oral and anal sex at this time.
**Seasonal Activity**

Avoid the following for the first year after allogeneic transplant:

- Raking leaves
- Hay rides
- Visiting orchards
- Hunting
- Mowing the lawn, landscaping, and cutting trees
- Avoid tick bites by wearing long sleeves, pants, and use DEET spray in areas prone to house ticks
- No live Christmas trees (Fake trees are permitted)
- Fishing is permitted; Do not handle any bait or fish
- Sledding and skiing are permitted after platelet count has recovered

**Physical Activity**

Continue the exercise program designed by you and your physical therapist. Staying active is beneficial for your lungs, heart, bones and muscles.

At first you may feel tired; this will improve as you continue your exercise program. Space out activities and schedule rest periods into your day. Avoid exhaustion; it may take up to 6 months before your stamina returns.

**Driving**

You may be on medications that impair your ability to drive. Consult with your physician before independently operating a motorized vehicle.

**Work**

Returning to work is dependent on your type of transplant.

- Decisions to return to work will be made by you and your transplant physician.
- Job environments that could potentially compromise your recovery should be discussed with your physician.

**Re-immunizations**

Your immune system is affected by the transplant you received and will require revaccination with the vaccines you received as a child. Vaccinations are an important part of your post-transplant care and recovery. Vaccinations may begin 6 months to one year after your transplant and will be scheduled by the Outpatient BMT Clinic.
Smoking, Alcohol, & Drugs
You should avoid smoking and secondhand smoke; this includes tobacco, marijuana, e-cigarettes, or similar products. Lung damage and infection are related to the use of these products.

Refrain from drinking alcohol for the first 6 months after transplant as it increases your risk of serious liver damage.

Illegal or illicit drugs should never be used.

Diet
After a transplant, it is important to eat a well-balanced diet with enough calories and protein. All transplant patients should follow good food safety guidelines. See the “Food Safety Guidelines” section.
Hygiene

**Mouth care:** Continue with the oral care routine you practiced in the hospital after all meals and at bedtime.

- Avoid mouthwashes that contain alcohol as they will dry out your mouth. Use a soft-bristle toothbrush.
- Check for sores in your mouth or throat and notify your doctor.
- Let your doctor know if you have any dental work planned. A dental follow-up is needed 6 months after transplant.

**Personal care:**

- Shower daily with mild antibacterial soap (Dial® or Zest®).
- Cover all central lines with Press and Seal®/Syran® wrap and tape prior to showering to keep the dressing dry. If dressing gets wet, change immediately.
- Change towels daily.
- Use a roll-on or stick deodorant.
- Wear hypoallergenic makeup and replace every 3 months.
- Change socks and underwear daily.
- Avoid acrylic nails for at least 1 year after transplant.

**Skin care:** It is normal for your skin to feel dry after a transplant. Moisturize daily with hypoallergenic lotions that do not contain alcohol, perfumes/scents or colors. Avoid using astringents on your face.

Always use sunscreen with at least SPF 30. Wear a protective hat and sunglasses. Limit the amount of time you are in the sun.

**Rectal care:** Your rectum may be sensitive for a period of time after transplant. Keep this area clean and avoid using enemas or suppositories. Inform your doctor of any new pain or symptoms.

**Cuts/bruises:** Clean all cuts and scrapes with mild soap and water. Inform your doctor if the area becomes red or tender, develops drainage, or if you develop a fever.

If you see bruises on your body for no reason, call your doctor. This may be an indication that your platelet count is low.
Medications at Home
You will be prescribed several medications upon discharge from the hospital. One pharmacy should be used for prescriptions to ensure complete and up-to-date records.

- Bring all medications to every follow-up appointment.
- DO NOT stop any medication without talking to your physician first.
- Call the outpatient BMT clinic with any side effects or concerns.
- Request refills during your clinic visits.
- Do not take Cyclosporine®, Tacrolimus®, or Sirolimus® on the morning before your clinic appointment. Bring these medication(s) along with you to take AFTER your blood draw.

For more information on specific medications you may be prescribed on discharge, see “Common Medications Post-transplant.”

Colds/Flu: You will be at risk for colds and flu for several months after discharge. At the first sign of illness, call your doctor.

- If you are told to use an over-the-counter medication, always choose a product without aspirin.
- Products with ibuprofen or acetaminophen can mask a fever and should not be used unless verified with your doctor or clinic nurse.
- Products containing antihistamines and/or nasal decongestants are best for colds. Avoid decongestant nasal sprays.
- Remember to take your temperature frequently when you are sick. Call the outpatient BMT clinic immediately if you experience a fever greater than 100.4 degrees.

Pain: Minor aches and pains are normal after discharge. If pain worsens or does not stop, call your doctor.

- If you need pain medication, choose one that does not contain aspirin or ibuprofen. These medications can cause bleeding.
- Acetaminophen (Tylenol®) is a good choice as it does not increase your risk of bleeding.
Stomach distress: Chemotherapy can cause damage to the lining of the mouth, esophagus, stomach, and intestines and may take weeks to heal. Nausea, sores, upset stomach or heartburn are common.

- Over-the-counter antacids should be used with caution, because they can interact with other medications you are taking.

Diarrhea: It is normal to have some diarrhea after leaving the hospital. However, inform your doctor of severe diarrhea, as it can be a sign of an infection or GVHD. Continue taking the anti-diarrhea medications you were given. Do not add any new over-the-counter medications until you talk with your physician.

Constipation: Constipation is unusual after transplant but can happen.

- Increase your intake of fluids.
- A gentle oral stool softener may help.
- DO NOT use rectal suppositories or enemas because they can cause rectal irritation and bleeding.
- Over-the-counter laxatives should NOT be used without asking your doctor.
Potential Complications

There are several potential complications of transplant. Complications can arise at any time during transplant or after transplant. Many of the associated complications do not last long and can be treated with medications and careful monitoring. Some examples of complications that you may experience are listed in the table below.

### Examples of Complications

<table>
<thead>
<tr>
<th>Nausea</th>
<th>Fever</th>
<th>Nutritional Issues</th>
<th>Sterility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vomiting</td>
<td>Liver (VOD)</td>
<td>Pneumonia</td>
<td>Secondary Cancers</td>
</tr>
<tr>
<td>Mouth Sores</td>
<td>Electrolyte Issues</td>
<td>GVHD*</td>
<td></td>
</tr>
<tr>
<td>Diarrhea</td>
<td>Engraftment syndrome</td>
<td>Infections</td>
<td></td>
</tr>
<tr>
<td>Transfusions</td>
<td>Kidney Problems</td>
<td>Endocrine Issues</td>
<td></td>
</tr>
</tbody>
</table>

* for allogeneic patients

### Infections

Even with a normal white blood cell count, you will still be at risk for infection for several months. Upon admission to the hospital, you will be started on preventative medications to protect you from infection.

If you get an infection while in the hospital, you will receive medications to treat it. Always inform your BMT team if you have fever, chills, and/or sweats. Common sites for infection are IV lines, lungs, GI tract and urinary tract.

### Liver

Veno-occlusive disease (VOD) also called sinusoidal obstructive syndrome (SOS) is a complication that affects the liver. It is caused by the high doses of conditioning chemotherapy you received. Signs and symptoms of VOD/SOS are yellow eyes and skin (jaundice), a swollen and tender belly, and rapid weight gain. You will be given medication to help prevent VOD/SOS while you are in the hospital.
Lungs and Heart
Some heart and lung problems can arise quickly, but others may not occur for months after transplant.

Lungs
A rare lung condition such as idiopathic pneumonia syndrome (IPS) is damage to the lung caused by graft versus host disease (GVHD) or the chemotherapy drugs or infection you received.

Typical tests that evaluate for BMT lung complications include:

- **Pulmonary function tests:** breathing assessment.
- **Bronchoscopy:** invasive procedure used for identification of GVHD and infection.
- **Chest X-rays/CT scans:** picture of the lungs used for diagnosis.

Always report a persistent cough and/or shortness of breath to your BMT team.

Heart
Potential heart problems include high blood pressure, stroke, irregular heartbeat, congestive heart failure, blood clots or heart attacks. Always call your doctor’s office about any chest pain, dizziness, palpitations or shortness of breath immediately.

Eyes
Chemotherapy, radiation and other medications used during your treatment can cause cataracts in the months and years after transplant. Cataracts can be treated, so it is important that all transplant patients see an eye doctor annually. You also may experience dry eyes which can be treated by an ophthalmologist.

Lack of Engraftment
While engraftment is a goal for discharge, there is a potential the new stem cells will not grow after transplant. This lack of bone marrow recovery is called, “engraftment failure.” The risk of rejection is less than 10 percent. Medications, such as Neupogen®, Zarxio® or Granix®, can be given to help stimulate new stem cell growth in your bone marrow. These medications are usually given by subcutaneous (sub-Q) injection each day until your blood count begins to recover. In some instances, a second transplant may be necessary. Your transplant physician will discuss this with you if this is an option.

Secondary Cancers
Due to the exposure to chemotherapy and radiation during cancer treatment and BMT transplant conditioning, patients have a risk of developing a secondary cancer. Cancers that may develop include skin cancers, mouth cancers or leukemias.
**Graft Versus Host Disease (GVHD)**

Graft versus Host Disease (GVHD) is a complication of allogeneic transplantation when the donated stem cells (the graft) react against your body (the host). Finding the best match possible for your transplant may decrease your risk of GVHD.

GVHD may develop as a skin rash on all or part of your body. The rash is red and may itch, but generally is not painful. The rash often starts on the cheeks, ears, neck, shoulders, palms and soles.

GVHD can have a useful purpose as it may also attack cancer cells that stayed in your body after transplant. The new donor cells have their own immune system to fight against any leftover cancer cells. Patients who get GVHD sometimes have a lower chance of relapse/recurrence of their cancer. This is called “graft vs. tumor effect.”

There are two types of GVHD: acute and chronic.

**Acute GVHD**

GVHD may develop as a skin rash on all or part of your body. The rash is red and may itch, but generally is not painful. The rash often starts on the cheeks, ears, neck, shoulders, palms of hands and soles of feet.

GVHD may also present itself in the intestines causing diarrhea and belly pain or the liver causing jaundice.

**Chronic GVHD**

Chronic GVHD can develop months after transplant. Chronic GVHD also affects the skin, liver and intestines but also can affect the eyes, lungs, kidneys and other organs.

Skin rashes may lead to tightening of the skin.

Dryness of the eyes and mouth caused by chronic GVHD may also occur. Eye drops will be prescribed and recommendations for an eye doctor will also be made.

**Treatment of GVHD?**

- **Prevention:** Allogeneic transplant patients will be given medications to decrease the risk of GVHD.

- **Extra-Corporeal Photopheresis (ECP):** ECP is an apheresis procedure that filters white blood cells from your blood and exposes them to ultraviolet light. The cells are then reinfused into the body causing an immune response to improve your GVHD.
  - This therapy is performed by Michigan Blood nurses.
  - ECP can be performed in the hospital or in the outpatient clinic.
  - Each session lasts approximately 2 - 3 hours, the physician will determine your treatment frequency.
When to Call the Doctor

The following are general guidelines. If you are unsure of symptoms or have a concern, call 616.486.5933, 24 hours a day, 7 days a week.

Notify your doctor of the following:

- Temperature 100.4 degree Fahrenheit or higher
- New cough
- New shortness of breath
- Headaches that do not go away
- Blurred or double vision
- Bleeding (nose, stool, vomit, urine)
- Increased bruising
- Red, swollen or painful areas
- Diarrhea, constipation, or vomiting
- Difficulty swallowing or new mouth sores
- Fever/chills or hives/itching after a blood transfusion
- New rash
- Abdominal cramping/pain with diarrhea
Common Transplant-Related Medications

You will be started on multiple new medications after your transplant. The table below includes some of the most common medications that may be started before or after transplant. Your transplant team, including specially-trained BMT pharmacists, will educate you on all new medications and help monitor your drug therapies.

<table>
<thead>
<tr>
<th>Common Transplant-Related Medications</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Infection Prevention</strong></td>
</tr>
<tr>
<td>Acyclovir (Zovirax)</td>
</tr>
<tr>
<td>Fluconazole (Diflucan)</td>
</tr>
<tr>
<td>Posaconazole (Noxafil)</td>
</tr>
<tr>
<td>Voriconazole (Vfend)</td>
</tr>
<tr>
<td>Levofloxacin (Levaquin)</td>
</tr>
<tr>
<td>Sulfamethoxazole/trimethoprim (Bactrim)</td>
</tr>
<tr>
<td>Pentamidine</td>
</tr>
<tr>
<td><strong>Gastrointestinal Agents</strong></td>
</tr>
<tr>
<td>Olanzapine (Zyprexa)</td>
</tr>
<tr>
<td>Ondansetron (Zofran)</td>
</tr>
<tr>
<td>Prochlorperazine (Compazine)</td>
</tr>
<tr>
<td>Lorazepam (Ativan)</td>
</tr>
<tr>
<td>Loperamide (Imodium)</td>
</tr>
<tr>
<td>Pantoprazole (Protonix)</td>
</tr>
<tr>
<td>Ursodiol (Actigall)</td>
</tr>
<tr>
<td><strong>Growth Factors</strong></td>
</tr>
<tr>
<td>Filgrastim (Neupogen, Zarxio, Granix)</td>
</tr>
<tr>
<td><strong>Immunosuppressant Medications (Allogeneic only)</strong></td>
</tr>
<tr>
<td>Tacrolimus (Prograf)</td>
</tr>
<tr>
<td>Cyclosporine (Neoral, Gengraf)</td>
</tr>
<tr>
<td>Mycophenolate (CellCept)</td>
</tr>
<tr>
<td>Sirolimus (Rapamune)</td>
</tr>
</tbody>
</table>
Food Safety Guidelines

Follow guidelines and tips to steer clear of getting an infection from food.

Food Handling

Clean
- Wash your hands before handling food.
- Clean all surfaces where food is prepared, such as countertops and tables.
- Keep sponges and towels clean.
- Wash all fruits and vegetables well. Do NOT use soap.

Separate
- Avoid cross-contamination by using different cutting boards and utensils for produce and meats.

Chill
- Keep cold foods cold.
- Refrigerate or freeze leftovers within 2 hours.
- Place leftovers in the refrigerator with a date. Throw leftovers away if not eaten in 24 hours (inpatient) and 72 hours (outpatient).
- Thaw frozen foods in the refrigerator or in cold water. Never thaw food at room temperature.

Cook
- Keep hot foods hot.
- Do not eat raw foods, such as sushi, rare meats and runny eggs.
- Cook meats to safe temperatures. See table below.

<table>
<thead>
<tr>
<th>Food</th>
<th>Temperature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground meat</td>
<td>165 degrees</td>
</tr>
<tr>
<td>Beef, pork, veal, lamb (roast, steak, chops)</td>
<td>145 degrees with 3 minute rest</td>
</tr>
<tr>
<td>Chicken, turkey, duck (whole, parts)</td>
<td>165 degrees</td>
</tr>
<tr>
<td>Leftovers and casseroles</td>
<td>165 degrees</td>
</tr>
<tr>
<td>Eggs</td>
<td>Until yolk and white are firm</td>
</tr>
<tr>
<td>Fish</td>
<td>145 degrees</td>
</tr>
<tr>
<td>Wild Game:</td>
<td></td>
</tr>
<tr>
<td>• Goose</td>
<td>165 degrees</td>
</tr>
<tr>
<td>• Venison</td>
<td>160 degrees</td>
</tr>
<tr>
<td>• Bear</td>
<td>160 degrees</td>
</tr>
</tbody>
</table>
Safe Water

- Municipal (city) tap water is safe, but be aware of TV or newspaper warnings for “boil-water advisories”.
- If you have well water have your well water tested by your local health department. Well water can be boiled rapidly for 15-20 minutes.
  - Store boiled water in the refrigerator.
  - Throw away water not used within 48 hours (2 days).
- Bottled water is safe if it meets FDA standards. Check your brand at www.bottledwater.org.
- Avoid fountain drinks and ice at restaurants, bars, theaters, gas stations, and quick-marts.

Patients Should NOT Eat:

- Food with a bad smell.
- Foods with bruises, cuts, and/or mold
- Foods from street vendors, buffets, salad bars, or shared bins in grocery stores
- Foods shared with others.
- Unpasteurized dairy products such as “raw” milk and cheeses made from unpasteurized milk.
- Unpasteurized fruit and vegetable juices, honey, and beer.
- Raw sprouts such as bean, alfalfa, clover, or other uncooked sprouts.

For more information:

- foodsafety.gov
- homefoodsafety.org
- fightback.org
- staging.caring4cancer.com

This handout does not take the place of a discussion with your doctor. Discuss any questions or concerns about acceptable foods with the BMT dietitian.
Common Terms

**Absolute Neutrophil Count (ANC) or Absolute Granulocyte Count:** The number of white blood cells present in the blood to fight infection.

**Allogeneic Transplant:** A transplant using a human donor who has bone marrow that is a match to the recipient.

**Anemia:** Low number of red blood cells in the bloodstream, resulting in insufficient oxygen to tissues and organs.

**Antibody:** A protein that helps the body to fight foreign substances such as bacteria, fungi and viruses.

**Antigen:** A foreign substance that stimulates the formation of antibodies in the body.

**Apheresis:** A blood-separating procedure in which blood is removed from a patient and sent through a special machine where blood cells are separated. Some of the cells are removed and the remainder of the blood product is returned to the patient.

**Aplastic Anemia:** A blood disorder in which the bone marrow is deficient in producing red blood cells, white blood cells and platelets.

**Aspiration (of marrow):** The removal of marrow from the cavities in the large bones by suction through a needle.

**Autologous Transplant:** A transplant in which a patient’s own blood stem cells are collected, frozen and then returned to the patient at a later date.

**Blood Cells:** Cells formed in the bone marrow that makes up blood.

- **Red Blood Cells:** Cells that carry oxygen throughout the body.
- **White Blood Cells:** Cells that help the body fight infection.
- **Platelets:** Cells that form blood clots to stop or prevent bleeding.

**Bone Marrow Harvest:** A procedure in which bone marrow is taken from the pelvic bone (hip) for use in a transplant.

**CD34 Count:** The CD labeling system aids in identifying the stage, maturation and lineage of blood cells. CD34 is the cell marker/label specific for hematopoietic stem cells.

**Central Line Catheter:** A semi-permanent intravenous catheter that is inserted into the large blood vessels that enters into the heart. It can be used for many weeks to months.

**Chemotherapy:** Drugs used to treat cancer, either by destroying abnormal cancer cells or by slowing their growth.

**Chimerism:** The extent of the mixture of donor stem cells in the recipient’s blood; generally expressed as a percentage.
Conditioning: A combination of chemotherapy drugs +/- radiation, given a few days prior to transplant to eliminate cancer cells and destroy the immune system.

Cytomegalovirus (CMV): A virus that causes flu-like symptoms in patients with normal immunity, and more severe problems (i.e. lung infections, liver problems and intestinal problems) in patients with suppressed immune systems.

DMSO: Abbreviation for dimethyl sulfoxide; a preservative that is used in the freezing of stem cells.

Engraftment: Growth of donor stem cells in the patient’s bone marrow.

Graft: Transplanted bone marrow and blood stem cells.

Granulocyte: A group of white blood cells that includes: neutrophils, eosinophils, and basophils.

Growth Factor (Colony Stimulating Factor): An injectable drug used to stimulate the development of blood cells (i.e. Zarzio®, Neupogen®, or Granix®).

Harvesting: Term used for the collection of stem cells from the bone marrow or peripheral blood.

Hematology: A division of medicine that studies and treats diseases of the blood and blood-forming tissues.

Hemorrhage: A large loss of blood brought about by injury to blood vessels or by lack of platelets to clot the blood.

Herpes Simplex: A virus that can produce small, painful, fluid-filled blisters on the skin and mucous membranes. This is very common in transplant patients.

Herpes Zoster (Varicella Zoster): A virus that can produce shingles; painful skin eruptions that follow the underlying nerve routes inflamed by the virus.

Immunosuppression: A state of decreased immunity or lowering of the body’s immune response. This can occur after receiving chemotherapy.

Irradiation: High-energy rays used to kill cells before or during transplant.

Leukemia: Cancer of the blood cells.

Leukocytes: A general term for all types of white blood cells.

Lymph Node: A gland in the body that produces lymph; the clear fluid that circulates through the body and contains white blood cells and antibodies.

Lymphocytes: A type of white blood cell. B-lymphocytes make antibodies against bacteria. T-lymphocytes attack virus-infected cells directly.

Lymphoma: Cancer of the lymph nodes.
**Malignant:** Cancerous; abnormal growth of cells.

**Microbial:** Minute forms of life such as bacteria, fungi or viruses.

**Mucositis:** Inflammation of the mucous membranes in the lining of the mouth.

**Neutropenia:** A low neutrophil count resulting in a compromised immune system.

**Neutrophil:** A type of white blood cell that fights bacteria.

**Oncology:** The study and treatment of cancer.

**Peripheral Blood Stem Cell Harvest:** A procedure in which stem cells are collected from the circulating blood for use in a transplant.

**Petechiae:** Small red spots under the skin caused by a low platelet count.

**Platelets:** Blood cells that promote blood clotting.

**Protocol:** A precisely timed and organized approach to treatment of disease.

**Relapse:** The recurrence of disease after a period of remission.

**Remission:** The decrease or disappearance of a disease and its symptoms.

**Stem Cells:** Baby cells found in the bone marrow that grow to become different types of blood cells.

**Syngeneic Transplant:** Transplant in which the donor is an identical twin.

**Thrombocytopenia:** The medical term for a low blood platelet count.

**Titer:** A blood test that assesses the levels of antibodies against various germs, such as bacteria or viruses.

**Total Parenteral Nutrition (TPN):** Intravenous feeding consisting of essential nutrients.

**Transfusion:** The infusion of a product derived from blood cells.

**Veno-Occlusive Disease (VOD):** A complication of transplant that can affect your liver.
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[80 FR 31465, May 16, 2016; 81 FR 46613, July 18, 2016]

ATENCIÓN: Si usted habla español, tiene a su disposición servicios gratuitos de asistencia lingüística. Llame al 1.844.359.1607 (TTY: TTY).

إذا كنت تتحدث اللغة العربية، فبإمكانك الحصول على المساعدة اللغوية المتاحة مجانًا. اتصل على الرقم 1.844.359.1607 (TTY: TTY).

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