Busulfan and Cyclophosphamide (Bu/Cy, Cy/Bu) Conditioning for Allogeneic Transplant

Care Team Contact Information: _____

Pharmacy Contact Information: _____

Diagnosis: _____

- This treatment is used as conditioning chemotherapy before an allogeneic stem cell transplant for acute lymphoblastic leukemia (ALL), acute myeloid leukemia (AML), chronic myeloid leukemia (CML), and myelodysplastic syndromes (MDS).
- It may also be used for other reasons.

Goal of Treatment: _____

Treatment Regimen

This treatment is often called Bu/Cy or Cy/Bu:

- **Bu**: Busulfan
- **Cy**: Cyclophosphamide

Treatment Name	How the Treatment Works	How the Treatment is Given
Busulfan (byoo-SUL-fan): Busulfex (byoo-SUL-feks), Myleran (MY-ler-an)	Damages the DNA in cancer cells, which stops them from growing and causes them to die.	Infusion into a vein (intravenous (IV) infusion).
Cyclophosphamide (sye-kloe-FOS- fa-mide): Frindovyx (frin-DOH-viks)	Slows down or stops the growth of cancer cells by damaging the genetic material that cancer cells need to multiply. It can also be used to dull the immune response.	Infusion into a vein (intravenous (IV) infusion).

Treatment Administration and Schedule

Treatment is typically 7 to 9 days before the infusion of your allogeneic stem cells. This is called stem cell “conditioning” chemotherapy. Your care team may measure the levels of busulfan in your bloodstream to guide or adjust busulfan dosing.

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Treatment Administration and Schedule (Continued)

☐ **Option 1**

Treatment Name	Conditioning Chemotherapy Schedule									
	Day -9	Day -8	Day -7	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Day 0
Busulfan	✓	✓	✓	✓						
Cyclophosphamide					✓	✓	✓	✓		
Stem Cell Infusion										✓

☐ **Option 2**

Treatment Name	Conditioning Chemotherapy Schedule							
	Day -7	Day -6	Day -5	Day -4	Day -3	Day -2	Day -1	Day 0
Busulfan	✓	✓	✓	✓				
Cyclophosphamide					✓	✓		
Stem Cell Infusion								✓

Appointments

Appointments may include regular check-ups with your care team, treatment appointments, lab visits, and imaging tests. It's important to keep your appointments whenever you can. If you miss an appointment, call your care team as soon as possible to reschedule it.

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Supportive Care to Prevent and Treat Side Effects

Description	Supportive Care Given at the Clinic or Hospital	Supportive Care Taken at Home
To help prevent or treat nausea and vomiting		
To help lower the risk of infections		
To help lower the risk of seizures		
To help lower the risk of liver injury (SOS/VOD)		
Other		

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Common Side Effects

Side Effect	Important Information
Low White Blood Cell (WBC) Count (Neutropenia) and Increased Risk of Infection (Boxed Warning)	Description: WBCs help protect your body from infections. A low WBC count increases your risk of infection. Recommendations: • Wash your hands often and bathe regularly. • Avoid crowded places and close contact with people who are sick. • Follow food safety and wound care advice from your care team. • Your care team may prescribe medicine to help your WBCs recover. Talk to your care team if you have: • Fever of 100.4°F (38°C) or higher • Chills • New or worsening cough or sore throat • Painful urination or signs of a urinary infection • Feeling much more tired than usual • Red, swollen, warm, or painful areas on the skin
Low Platelet Count (Thrombocytopenia) (Boxed Warning)	Description: Platelets help your blood clot and wounds heal. A low platelet count increases your risk of bruising and bleeding. Recommendations: • Blow your nose gently and avoid picking it. • Brush your teeth gently with a soft toothbrush and keep good oral hygiene. • Use an electric razor for shaving and nail file instead of nail clippers. • Avoid over-the-counter medicines that can increase bleeding risk (for example, nonsteroidal anti-inflammatory drugs (NSAIDs) like ibuprofen). • Talk with your care team or dentist before medical or dental procedures – you may need to pause treatment. Talk to your care team if you have: • A nosebleed lasting more than 5 minutes despite pressure • A cut that continues to bleed • Heavy gum bleeding when brushing or flossing • Sudden or severe headache • Blood in your urine or stool • Blood in your spit after coughing
Low Red Blood Cell (RBC) Count and Hemoglobin (Hgb) (Anemia) (Boxed Warning)	Description: RBCs and Hgb carry oxygen to your body's tissues and remove carbon dioxide. Low RBC or Hgb (anemia) can make you feel weak, very tired, or look pale. Recommendations: • Aim for 7 to 8 hours of sleep each night. • Do not drive, operate heavy machinery, or do other dangerous activities if you are very tired. • Balance activity and rest – stay as active as you can, but rest when needed. • Eat a balanced diet and follow any nutrition or supplement advice from your care team. Talk to your care team if you have: • Shortness of breath • Dizziness or fainting • Fast or irregular heartbeats • Sudden or severe headache

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Fatigue	Description: Fatigue is a constant and sometimes strong feeling of tiredness. Recommendations: • Routine exercise can help reduce fatigue. Talk with your care team to find the right type and amount of activity for you. • Ask family and friends for help with daily tasks and for emotional support. • Try healthy ways to feel better, such as meditation, journaling, yoga, or guided imagery, to reduce anxiety and improve well-being. • Aim for 7 to 8 hours of sleep each night. Limit daytime naps to help you sleep better at night. • Do not drive, operate heavy machinery, or do other potentially dangerous activities if you are very tired. Talk to your care team if you have: • Tiredness that affects your daily life or prevents you from doing normal activities • Tiredness that does not get better with rest • Dizziness or weakness along with severe tiredness
Mouth Sores or Irritation (Mucositis or Stomatitis)	Description: Treatment can irritate the lining of the mouth. In some cases, this can cause redness, sores, pain, and swelling. Recommendations: • Rinse your mouth after meals and at bedtime; rinse more often if sores develop. • Brush your teeth gently with a soft toothbrush or use a cotton swab after meals. • Use a mild, non-alcohol mouth rinse at least 4 times daily (after meals and at bedtime). Example: 1/8 teaspoon salt + 1/4 teaspoon baking soda in 8 oz warm water. • Avoid acidic, hot, spicy, rough, or crunchy foods and drinks that can irritate your mouth. • Avoid tobacco, alcohol, and alcohol-based mouthwash. • Your care team may prescribe medicines or mouth treatments to help with pain and healing. Talk to your care team if you have: • Painful mouth sores or throat pain • Trouble eating or significant weight loss

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<table>
<tr><td>Nausea and Vomiting</td><td>Description: Nausea is an uncomfortable feeling in your stomach or the need to throw up. You may or may not vomit.
Recommendations:
Eat smaller, more frequent meals.
Avoid fatty, fried, spicy, or highly sweet foods.
Eat bland foods at room temperature and drink clear liquids.
If you vomit, start with small sips of water, broth, or other clear liquids. If these stay down, try soft foods (such as gelatin, plain cornstarch pudding, yogurt, strained soup, or strained cooked cereal) and gradually return to solid foods.
Your care team may prescribe medicine for these symptoms.
Talk to your care team if you have:
Vomiting for more than 24 hours
Nonstop vomiting
Signs of dehydration (very thirsty, dry mouth, dizziness, or dark urine)
Blood or coffee-ground-like appearance in your vomit
Severe stomach pain that does not go away after vomiting</td></tr>
<tr><td>Liver Problems</td><td>Description: Treatment can cause liver injury. Your care team may check your liver with blood tests before and during treatment.
Talk to your care team if you have:
Yellowing of your skin or the white part of your eyes (jaundice)
Severe nausea or vomiting
Pain on the right side of your stomach area (abdomen)
Dark, tea-colored urine
Bleeding or bruising more easily than normal</td></tr>
<tr><td>Diarrhea</td><td>Description: Diarrhea means having bowel movements more often than usual. Your stools may also be loose or watery.
Recommendations:
Keep track of how often you have diarrhea.
Drink 8 to 10 glasses of water or fluids each day. Do this unless your care team tells you otherwise.
Eat small meals with low-fiber foods. Try bananas, applesauce, potatoes, chicken, rice, or toast.
Avoid high-fiber foods. These include raw vegetables, fruit, and whole grains.
Avoid foods that may cause gas. These include broccoli and beans.
Avoid milk, yogurt, and other dairy foods.
Avoid spicy, fried, or greasy foods.
Your care team may recommend medicine for diarrhea. One example is loperamide (Imodium).
Talk to your care team if you have:
An increase of 4 or more bowel movements than usual in one day.
Dizziness or lightheadedness while you have diarrhea
Signs of dehydration, such as feeling very thirsty, dizzy, or having dark urine
Blood in your stool</td></tr>
</table>

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Lung Problems	Descriptions: Busulfan can cause people to develop lung problems after treatment. These problems may include lung inflammation (interstitial pneumonitis), lung scarring (pulmonary fibrosis), and breathing problems associated with high levels of oxygen and/or intravenous fluids. Your care team will check your lungs with breathing tests called pulmonary function tests (PFTs). Recommendations: • Avoid scuba diving. The increased pressure underwater and high oxygen levels may cause further lung damage. • Tell your surgeon, anesthesiologist, and other healthcare providers about your medical history before any scheduled procedures that may require oxygen. • Avoid breathing high levels of oxygen unless needed. Too much oxygen may cause further lung damage. If you need oxygen, your care team will monitor your oxygen levels and give you the amount you need. • Get the pneumococcal (pneumonia) vaccine when directed by your care team. • Get yearly influenza (flu) vaccines when directed by your care team. • Don't smoke. If you currently smoke, talk to your care team about a program to help you quit. Talk to your care team if you have: • Shortness of breath • A new dry cough • Wheezing • Chest discomfort • Fever

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Rash or Itchy Skin	Description: Rash or itchy skin can cause redness, skin darkening, swelling, and a variety of bumps or patches (small red spots, welts, blisters, or scaly dry areas). Recommendations: • Keep your skin moisturized with creams or lotions to reduce rash and itchiness. • Wear loose-fitting clothing. • Avoid perfumes and colognes, as they may worsen rash symptoms. • Limit time spent in the heat to prevent worsening symptoms. • Avoid sun exposure, especially between 10 AM and 4 PM, to lower the risk of sunburn. • Wear long-sleeved clothing with ultraviolet (UV) protection and broad-brimmed hats. • Apply broad-spectrum sunscreen (UVA/UVB) with sun protective factor (SPF) 30 or higher as directed. • Use lip balm with SPF 30 or higher. • Avoid tanning beds. • Your care team may recommend medicines for symptoms. Talk to your care team if you have: • Rash or itching that continues to worsen

Select Rare Side Effects

Side Effect	Talk to Your Care Team if You Have Any of These Signs or Symptoms
Heart Problems	• Swelling of your stomach area (abdomen), legs, hands, feet, or ankles • Shortness of breath • Nausea or vomiting • New or worsening chest discomfort, including pain or pressure • Weight pain • Pain or discomfort in your arms, back, neck, or jaw • Protruding neck veins • Breaking out in a cold sweat • Feeling lightheaded or dizzy • Fast or irregular heartbeat
Bladder Irritation (Hemorrhagic Cystitis)	Cyclophosphamide can irritate your bladder. To help prevent this, drink 2 to 3 liters of water each day for 48 to 72 hours after each dose of cyclophosphamide. • Blood in the urine • Painful urination • Urinating more frequently • Stomach (abdominal) or pelvic pain • Fever of 100.4°F (38°C) or higher

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Sinusoidal Obstruction Syndrome (SOS), also called Veno-Occlusive Disease (VOD)	This is a condition where tiny blood vessels in the liver become blocked after certain cancer treatments, especially those using busulfan. Get medical help right away if you develop any of the following during or after your infusion: • Yellowing of your skin or the white part of your eyes (jaundice) • Rapid weight gain • Swollen stomach area (abdomen) • Severe nausea or vomiting • Pain on the right side of your stomach area (abdomen) • Dark, tea-colored urine • Decreased urination • Bleeding or bruising more easily than normal
Seizures or Brain Problems	Get medical help right away if you develop any of the following during or after your infusion: • Sudden uncontrollable jerking movements • Loss of consciousness • Confusion or “staring spells" • Muscle stiffness • Repetitive movements (such as lip-smacking) • Sensory disturbances (like tingling or auras) • Postictal confusion (a state of confusion after the seizure) • Headache • Dizziness • Confusion • Memory problems • Difficulty concentrating • Fatigue • Muscle weakness • Tremors • Changes in mood or behavior • Sensory disturbances (such as tingling or numbness)
Risk of New Cancers	There is a risk of developing new cancers during or after treatment. Talk with your care team about this risk, and ask about the signs and symptoms of new cancers.

Before starting treatment, ask your care team when to call 9-1-1 or seek emergency help.
If you experience any new, worsening, or uncontrolled side effects, contact your care team immediately.

Intimacy, Pregnancy, and Breastfeeding

- Treatment may **change how you feel about intimacy and your body.** However, physical closeness—such as holding hands and hugging—remains safe. It is common to have questions about intimacy. If needed, talk to your care team for guidance.
- Treatment may **harm an unborn baby**.
    - If you are able to become pregnant:
        - Your care team will verify your pregnancy status before treatment.
        - Use an effective method of birth control during treatment, for 6 months after your last dose of busulfan, and for 1 year after your last dose of cyclophosphamide.
        - If you think you might be pregnant or if you become pregnant, tell your care team right away.

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- If your partner is able to become pregnant, use an effective method of birth control—such as condoms—during treatment, for 3 months after your last dose of busulfan, and for 4 months after your last dose of cyclophosphamide.

- **Do not breastfeed** during treatment and for 1 week after your last dose of busulfan and cyclophosphamide.

Handling Body Fluids and Waste

Some drugs you receive may stay in your urine, stool, sweat, or vomit for many days after treatment. Because many cancer drugs are toxic, your body waste may also be dangerous to touch. To help protect yourself, your loved ones, and the environment, **follow these instructions** for at least **48 hours** after each dose of **busulfan** and **cyclophosphamide**.

- People who are pregnant should avoid touching anything that may be soiled with body fluids from the patient.
- You can use your usual toilet. Always close the lid and flush to discard all waste. If you have a low-flow toilet, flush twice.
- If the toilet or seat is soiled with urine, stool, or vomit, clean the surface after each use before others use it.
- Wash your hands with soap and water for at least 20 seconds after using the toilet.
- If you need a bedpan, inform your caregiver so they can wear gloves and assist with cleanup. Wash the bedpan with soap and water daily.
- If you cannot control your bladder or bowels, use a disposable pad with a plastic back, a diaper, or a sheet to absorb waste.
- Wash any skin exposed to body waste with soap and water.
- Wash soiled linens or clothing separately from other laundry. If you don't have a washer, place them in a plastic bag until they can be washed.
- Wash your hands with soap and water after touching soiled linens or clothing.

Additional Information

- **Tell your care team about all the medicines you take**.
  This includes prescriptions, over-the-counter drugs, vitamins, and herbal products. Before starting any new medicine, supplement, or vaccine, ask your care team first.
  - Avoid taking acetaminophen for 72 hours before and during treatment with busulfan unless your care team tells you otherwise. Taking these medicines together may increase the risk of side effects from busulfan.
- **This Patient Education Sheet may not describe all possible side effects.**
  Call your care team for medical advice about side effects. You may report side effects to the FDA at 1-800-FDA-1088.

Notes

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Patient Education Sheets

Scan the QR code below to access this education sheet.

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