# Applicable Laboratory(s)):

[x]  North Carolina Baptist Hospital (NCBH)

[ ]  Lexington Medical Center (LMC)

[ ]  Davie Medical Center (DMC)

[ ]  Wilkes Medical Center (WMC)

[ ]  High Point Medical Center (HPMC)

[ ]  Westchester

[ ]  Clemmons

**PURPOSE:** Cryopreserved products are transported through contiguous buildings in the

 medical center to the patient bedside and rapidly thawed in a water bath

 under controlled conditions and temperatures for reinfusion into the patient.

# Scope: This procedure applies to all cryopreserved products infused by the SCTCT

#  Lab.

# Definitions

1. Procedure: A process or method for accomplishing a specific task or objective.
2. WFBH Lab System: Wake Forest Baptist Lab System is a health system that includes Wake Forest Baptist Medical Center and all affiliated organizations including Wake Forest University Health Sciences (WFUHS), North Carolina Baptist Hospital (NCBH), Lexington Medical Center (LMC), Davie Medical Center (DMC), Wilkes Medical Center (WMC), High Point Medical Center (HPMC), Lab at Westchester and Lab at Clemmons.
3. DPBS: Dulbecco’s Phosphate Buffered Saline
4. HPC: Hematopoietic Progenitor Cells
5. DLI: Donor lymphocyte Infusion
6. PPE: Personal Protective Equipment

# Reagents/Media: 70% Ethanol, Dulbecco’s Phosphate Buffered Saline (DPBS), Plasmalyte-A, Heparin (1000units/ml), Trypan Blue

# Supplies/Materials: Sterile Towels, Alcohol Pads, Under Pads, Syringes 10, 30,

# gauge, Ultra pure water, Liquid Nitrogen, Needles 16, 20 gauge, Sterile Gloves, Sterile tubes, 12x75mm, Sampling Site Couplers, Sterile Overwrap Bags, Sterile Specimen Cups, Sterile Scissors, Sterile Hemostat

# Equipment: Laminar Flow Hood, Water Bath, Thermometer, Liquid Nitrogen Transport Container, Laminar Flow Hood, CD34 Selected infusion: Timer

# Sample Requirements: Cryopreserved HPC product for infusion

# Specimen Acceptability and Rejection Criteria: Do not thaw any cryopreserved product that is obviously compromised without consulting the medical director.

# Calibration: n/a

# Quality Control: n/a

# Corrective Action: n/a

# PROTOCOLS:

* Products expire 30 minutes postthaw.
* Frozen storage temperature for products is < -120°C.
* Frozen products should only be transported in a validated container that is designated for liquid nitrogen (LN2) storage.

**D.** Sections:

1. Preparation for Infusion
2. Day of Infusion
3. Preparation at Infusion Site
4. Thawing/Infusion
5. Broken Bag
6. CD34+ Enriched Cell Infusion
7. Post Infusion

VIII. Adverse Reaction Workup

# Procedure Guidelines

**Section I: Preparation for Infusion**

1. Enter patient last name on the BMT Lab calendar on BMT Monitor 1 on the infusion date.
	1. Print the Physician EPIC order for infusion from EPIC under the patient medical

record number.

1. Complete Infusion Checklist – Single Product, SCT-FORMS-0127.

 2.1 Open checklist in computer

 a. Location: G:/Processing Lab/Lab SOP/Lab Reports/Infusion Checklist –

 Single Product.

* 1. Enter as much information as possible, referring to the chart below.

|  |  |  |
| --- | --- | --- |
| **Fields** | **Source** | **Information/****Comments** |
| Recipient and Donor information, Sample number, infusion date, serology results | Physician’s EPIC Order  |  |
| % of product infused | Autologous HPC,Apheresis Cryoprocessing Worksheet | * Refer to EPIC Order to determine how many bags to infuse
* If 100% infused, enter patient information and vial location on Vial Release Clipboard.
 |
| Harvest Date, Sample #, Product Name, Bag #, Total mL and cell counts of bags | Autologous HPC,Apheresis Cryoprocessing Worksheet | Enter each bag for infusion on a separate line of the Infusion Checklist – **Use Post-Processing Values** |
| Microbiology cultures | Hospital computer system – EPIC | BMT Product Cultures from each Day of Collection; Refer to *Sterility Check, Patient Related* SCT-SOP-0134 for any positive cultures. |

1. Save Infusion Checklist in Patients Infused File, under current year and patient name.
2. Print page 1 of the Infusion Checklist.
3. Complete Cellular Product Infusion Log, SCT-FORMS-0345.

5.1 For collections processed before 7/15/1997, take a frozen vial with a Request to

 Confirm Group/Type SCT-FORMS-0107 to the blood bank for an ABO/Rh

 confirmation for each collection date to be infused.

* 1. Enter the ABO/Rh results on the Cellular Product Infusion Log and on the bag labels

 when the product is thawed.

1. Complete Report of Adverse Reaction to Stem Cell Components Form, SCT-FORMS-0132.
2. Complete Technical Release Criteria Form, SCT-FORMS-0131.
	1. Form must be signed by the medical director before the infusion.
	2. If product is nonconforming, form must be signed by attending physician and medical director prior to infusion.
3. Review information on all completed forms; Initial and date.

9. Complete form verification with second technologist.

9.1 Verification includes checking all forms against source documentation.

 9.2 Verifier initials and dates the Infusion Checklist and the Cellular Product Infusion

 Log.

 10.

EXPECTED OUTCOME RESULTS: All paperwork should be completed at the time of infusion.

ACCEPTABLE RANGES: Transplant doses shall be at least 2 x 106 CD34+/kg for HPC and marrow and at least 5 x 106 CD3+/kg for DLI.

**Section II. Day of Infusion**

1. Confirm the infusion time with the Nurse coordinator or the SCT Unit.
2. Clean the water bath with 70% ethanol, let air dry.
3. Clean the inner lining of the LN2 transport container with 70% ethanol, let air dry.
4. Fill water bath 1/3 full with Ultrapure water and heat to 37°C.
	1. Waterbath cover shall remain in place when not thawing cells.
	2. Water temperature should remain at 30-37°C
5. Use ladle to pour 5 inches of liquid nitrogen (LN2) into the LN2 transport container.

Personal Protective Equipment: Lab Coat, Shoulder Length Cryogloves, Face Shield.

* 1. Note the time container filled on the Infusion Checklist.
1. Remove bags for infusion from the reservoir and place them directly in the LN2 transport container. PRODUCTS SHALL REMAIN IN CANISTERS FOR TRANSPORT.

Personal Protective Equipment: Lab Coat, Shoulder Length Cryogloves, Face Shield.

* 1. If product bag integrity appears compromised or questionable, place it in

 an overwrap in the LN2 transport container and consult Medical Director

 before proceeding.

1. Complete information in the Product Release and Transport section of the Infusion Checklist.
	1. A second technologist should verify the name, medical record number,

 bag number, and unique alphanumeric identifier on the bag from the Infusion

 paperwork and initial the Product Release and Transport section of the

 Infusion Checklist.

1. Close and lock the LN2 transport container.
2. Restock the infusion cart.
	1. Restock 16g needles, sampling site couplers, alcohol pads, sterile towels,

overwraps, luer tip caps, 60 and 30mL syringes, sterile hemostats, sterile scissors, sterile gloves, and sterile cups.

 9.2 Ensure a lab coat, cryogloves, and ethanol bottle are on the infusion cart.

1. Record lot numbers of supplies and reagents used on the Reagent and Disposable Log, SCT-FORMS-0101.
2. Place the following completed patient forms in the folder on the cart:

 Cellular Product Infusion Record

Report of Adverse Reaction Form

1. Transport cart to infusion location about 15 minutes before scheduled infusion time.
2.

|  |  |
| --- | --- |
| **If infusion is delayed:** | **Proceed to** |
| To a different date | * Obtain a new Infusion Request
* Correct the dates on the infusion forms as needed to match the infusion date or prepare new forms to match the request.
 |
| And is partially completed | * Correct the information on all forms and tags to reflect what the patient actually received.
* A new infusion request is needed when the remaining product will be infused.
 |

13., continued.

* The integrity of the primary container must not have been compromised.
* Document on an Occurrence Form.
* The medical director will determine any additional action to be taken to ensure product safety and viability.

EXPECTED OUTCOME RESULTS: Product bags should arrive at the infusion site at the specified time.

ACCEPTABLE RANGES: The name and medical record number on the Infusion Request shall match exactly the name and medical record number on the product bags. Any discrepancies shall be reported to the medical director.

**Section III. Preparation at the Infusion Site**

1. Plug waterbath into an outlet.
2. Check temperature of waterbath and record on Cellular Product Infusion Record.
3. Clear a workspace on the counter in the patient room.

3.1 Wash hands with germicidal soap and put on lab coat, sterile gloves.

1. Disinfect the area with 70% ethanol and paper towels.
2. Cover the counter with an underpad blue side down.
3. Assemble materials:

 Syringes Sampling Site Couplers Alcohol Pads

 Overwrap Bags One Sterile Cup Luer tip caps

 Sterile Hemostats Sterile Scissors 70% Ethanol

 Extra Sterile Gloves Forceps 16 g needles

1. Unwrap sampling site couplers.
2. Open a sterile towel and lay folded on the blue underpad.
3. The infusing physician will signal when to thaw the first bag.

DO NOT THAW ANY PRODUCT UNTIL INFUSION PHYSICIAN INDICATES THAT THE PATIENT IS READY.

EXPECTED OUTCOME RESULTS: Sufficient supplies and reagents should be assembled at the start of the infusion.

ACCEPTABLE RANGES: n/a

**Section IV. Thawing and Infusion**

1. Don cryogloves and remove one canister from the LN2 transport container.
2. Open the canister and place the opened canister in prepared infusion work area, while avoiding touching the cryogloves to any items in the prepared work area.
3. Remove cryogloves and don sterile gloves.
4. Tear overwrap bag at perforation.
5. Transfer product bag from canister into the sterile overwrap bag.

Personal Protective Equipment: Lab Coat, Face Shield, Sterile Gloves

1. Gently submerge bag in waterbath keeping the opening of overwrap bag above the waterline.

Personal Protective Equipment: Sterile Gloves, Lab Coat

1. Gently press the bag contents against the bottom of the waterbath to facilitate thawing.
	1. If bag leaks, immediately follow steps in Broken Bag Section, Section V.
2. When completely thawed but still very cold, remove from the water bath.
3. Remove bag from the overwrap and place on the sterile towel.
4. Dry the product bag and your gloves well on the sterile towel.
	1. Observe the towel for signs of leakage.

1. Remove one port cover and insert a sampling site coupler.
2. Clean sampling site coupler with an alcohol pad.
3. Open and pull air into a 60mL syringe.
4. Insert a 60mL syringe onto port by screwing the luer lock down.
5. Inject the air in the syringe into the product bag, and then draw cells into the labeled syringe.
6. With syringe still attached to bag, remove 3.75” x 1.5” ISBT label from cryobag pocket.
	1. Place ISBT label on attached syringe.
7. Remove syringe from bag and cap syringe tip with a luer tip cap.
8. Note time of beginning of infusion.

 16.1 This can be recorded on the Report of Adverse Reaction Form.

1. Give syringe to the infusion physician and have them compare the patient information on the product bag and the syringe label.
	1. Infusing physician should read back the name and medical record number

 from the syringe while the BMT tech is reading the product bag.

* 1. DO NOT USE A LEUKOCYTE REDUCTION FILTER OR IRRADIATE THE

 PRODUCT

17.3 Infusing physician will read back name and medical record number with the

 nurse at the bedside from the syringe and the patient’s armband.

1. Remove product bag label and put empty bag into an overwrap bag.
2. Thaw next bag AT PHYSICIAN'S REQUEST.

 19.1 Do not begin thawing the next bag until the physician indicates that the

 patient is ready.

1. After all bags are infused, have physician sign all accompanying paperwork.
2.
3. Complete each bag product label: Date/time thawed, Time Infused, Initials.
4. Consult with the infusing physician and Medical Director for additional workup if any product appears unacceptable for infusion.

 22.1 Adjust the infusion paperwork to indicate the volume and number of cells

 infused.

 22.2 Use the Addendum Report, page 2 of the Infusion Checklist, to recalculate

 volume infused. (A second technologist must verify)

 22.3 Take corrected paperwork back to the unit for the patient's chart.

 22.4 Complete a Quality Assurance Exception Report.

1. Give Notification of Infusion form, product bag labels, and white copy of Infusion Tag to the infusing physician or unit secretary for the patient's chart.
2. Retain all other signed paperwork for patient's BMT lab chart.
3. Cover empty product bags in a sterile towel and place on infusion cart.
4. Discard trash and clean work area with 70% ethanol.
5. Remove PPE, wash hands, and return to BMT lab.

EXPECTED OUTCOME RESULTS:

Product bag should be intact upon thaw.

Product bag should be thawed quickly at the patient bedside and infused within 30 minutes post thaw.

ACCEPTABLE RANGES: n/a

**Section V. Broken Bag**

1. Clamp the broken area of the product bag with a sterile hemostat if a minor leak occurs during thawing.

 1.1 Continue with thawing procedure and recover as many cells as possible

 into the syringe.

2. Respond to a major leak as follows:

2.1 Label a sterile specimen cup and loosen lid

2.2 Align a corner of the overwrap bag with the same corner of the product bag.

2.3 Swab the corner of the overwrap thoroughly with alcohol pads

2.4 Tilt the bag away from the aligned corners.

2.5 Align the specimen cup directly underneath the aligned corners

2.6 Cut corners of both bags simultaneously and completely with sterile scissors

2.7 Carefully tilt the overwrap bag allowing the cells to flow into the specimen cup

2.8 Draw the contents into a syringe.

2.9 Cap the syringe with a luer tip cap.

2.10 Record the mL recovered

2.11 Give syringe to infusion physician for verification and infusion

 2.12 Place lid back on cup and place the empty cup into a separate sterile

 overwrap bag for sterility check

3. Record the broken bag in the Comments Section of the Cellular Product Infusion Record.

4. Keep broken bag separate from any other bags infused.

 4.1 Culture and send to microbiology with a requisition with specimen source

 BMTPI-BB.

 4.2 Refer to Sterility Check - Patient Related procedure.

5. Complete Addendum Report (page 2 of the Infusion Checklist) and print.

 5.1 Send a copy of completed page 2 to the SCTCT Unit for the patient chart.

EXPECTED OUTCOME RESULTS: The majority of the cells in a broken bag should be recovered for infusion.

ACCEPTABLE RANGES: n/a

**Section VI. CD34+ Enriched Cells Infusion**

1. Prepare heparinized Plasmalyte-A.

1.1 Add 25mL Plasmalyte-A and 0.25mL heparin (1000units/mL) to 50mL sterile centrifuge tubes using a 30mL syringe and 16 gauge needle.

 1.2 Place capped tubes in a rack on the infusion cart.

 1.3 Prepare 2 tubes for each bag of cells.

2. Follow procedure for PREPARATION, DAY OF INFUSION, and PREPARATION AT THE INFUSION SITE.

3. Transfer product bag from liquid nitrogen into the sterile overwrap bag with forceps.

Personal Protective Equipment: Lab Coat, Face Shield, Cryogloves

4. Gently submerge bag in waterbath keeping the opening of overwrap bag above the waterline.

5. Gently press the bag contents against the bottom of the waterbath to facilitate thawing.

 5.1 If bag leaks, immediately follow steps in Broken Bag Section V.

6. When completely thawed but still very cold, remove from the water bath.

7. Remove product bag from the overwrap and place on the sterile towel.

8. Dry the product bag and your gloves well on the sterile towel.

 8.1 Observe the towel for signs of leakage.

9. Spike one port of the bag with a sampling site coupler.

10. Draw 25mL heparinized Plasmalyte-A into a labeled syringe, wipe the coupler with an alcohol pad, and slowly add the syringe contents to the bag over a 3 minute period.

11. Measure the final volume and record on the Infusion Checklist.

12. Give the cells to the physician; have them verify the patient information on the syringe and the bag label.

12.1 Patient name and medical record number should be verified.

13. Rinse the product bag with 25mL of heparinized Plasmalyte-A. Leave 0.5mL rinse in the bag and withdraw remaining into syringe.

14. Give labeled syringe with the rinse to the physician for infusion.

15. Repeat steps 3-14 with each bag until all bags have been infused.

EXPECTED OUTCOME RESULTS: Product bags should be thawed without breaks and all paperwork should be complete at the end of infusion.

ACCEPTABLE RANGES: n/a

**Section VII. Post Infusion**

1. Empty, dry and clean the waterbath with 70% ethanol.
2. Draw 2-3mL DPBS into a 3mL syringe.

 Personal Protective Equipment: Biological Safety Cabinet

1. Clean sampling site coupler of empty infusion bag with an alcohol pad.
2. Connect 3mL syringe to freezing bag, inject DPBS into empty infusion bag and rinse.
3. Draw rinse back into syringe.
4. Repeat steps 3-6 with each infusion bag

 6.1 Use the same syringe and DPBS.

7. Dispense rinse into a 12 x 75 sterile tube.

8. Dilute rinse as necessary and perform Viability by Trypan Blue.

 8.1 Refer to Viability by Trypan Blue, BMT.Routine.1007.

9. Complete Post-Infusion Checklist section at the bottom of the Infusion Checklist.

 9.1 Enter charges in blood bank computer system as AMI/MMI, one charge per bag.

 9.2 Data Entered in Cancer Center Database, may be left blank until patient is

 entered into CIBMTR.

1. Make copy of Report of Adverse Reaction Form and file in Adverse Reaction Log Book.

 10.1 Form must be signed by the infusion physician and the Medical Director.

EXPECTED OUTCOME RESULTS: Viability by Trypan Blue should be completed.

ACCEPTABLE RANGES: Viability Post Thaw should be ≥70%. Any value less than 70% shall be reported immediately to the medical director.

**Section VIII. Adverse Reaction Workup**

1. Complete the Report of Adverse Reaction to Stem Cell Products for all infusions.
2. Inform the Medical Director immediately of ANY adverse reaction.

2.1 Additional testing will be ordered at the discretion of the medical director.

1. File the original Report of Adverse Reaction to Stem Cell Products in the patient's file and a copy in the Adverse Reaction Log Book.
2. Record "Yes" or "No" in reaction column of patient index.

EXPECTED OUTCOME RESULTS

• Product bag should be intact upon thaw.

• Product bag should be thawed quickly at the patient bedside and infused within 30 minutes post thaw.

ACCEPTABLE RANGES: All reactions to stem cell components shall be immediately reported to the medical director.

**Literature References**: Reiffe, J. Goldman, J, Armitage, J, eds. Blood Stem Cell

 Transplantation. 1st ed. 1998: 4;67-68.

 Areman, E., Loper, K., Cellular Therapy: Principles, Methods,

 and Regulations, 2009. Chapter 31, Thawing and Infusion.

# Related procedures/policies in Navex/Policy Tech: Viability by Trypan Blue, SCT-

#  SOP-0078

#  Process Control for the Release of Cell Therapy Products, SCT-SOP-0141

# Attachments/Linked documents in title 21:

• Infusion Checklist, SCT-FORMS-0127

• Cellular Product Infusion Record, SCT-FORMS-0345

• Request to Confirm Group/Type, SCT-FORMS-0107

• Report of Adverse Reaction to Stem Cell Components Form, SCT-FORMS-0132

• Technical Release Criteria Checklist, SCT-FORMS-0131

# Revision Dates: Review Change Summary as represented in Title 21.