Cell Processing Labs, Your Best Friends

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Medical Director, Cell Therapy Lab/Scientific and Medical Director of cGMP facility,(MCT)/Director of the Division of Transfusion Medicine
University of Minnesota
Welcome

John Miller, MD, PhD
VP and Sr. Medical Director, Medical, Quality & Regulatory
NMDP/Be The Match
Disclosures

The following faculty and planning committee staff have no financial disclosures:

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Betsy Blunk, BSN, RN, CHTC, BMTCN</td>
<td>Sarah Cannon Blood Cancer Network</td>
</tr>
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<td>Kathryn M. Bushnell-Crowley, BS, MLS(ASCP)</td>
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<td>Kuchen Hale</td>
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<td>David H. McKenna, M.D.</td>
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<td>Amy McGarrity</td>
<td>NMDP/Be The Match</td>
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<tr>
<td>John Miller, MD, PhD</td>
<td>NMDP/Be The Match</td>
</tr>
</tbody>
</table>
Learning Objectives

At the conclusion of this session, attendees will be able to:

• Examine TNC optimization processes.
• Provide examples of processing techniques to enhance the quality of products.
• Evaluate best practices in cellular therapy processing.
Cell Processing Labs: Your Best Friends!

Kathryn Bushnell-Crowley, BS, MLS(ASCP)
Cellular Therapy Center
Dartmouth Hitchcock Medical Center
Cell Processing Labs: Your Best Friends!

Brief description of our center
Total Nucleated Counts
Neutrophils
Hematocrit
What your best friends can do for you
What you can do for your best friends
Dartmouth-Hitchcock Medical Center

Apheresis Center (Blood Donor Program)
Collection Center (Blood and Marrow Transplant)
Processing Lab (Cellular Therapy Center)
Transplant Center (Blood and Marrow Transplant)
Patient (Hematology Special Care Unit)
AC / CC to TC

NMDP AC  NMDP CC

Cellular Therapy Center (Processing Lab)

Patient
BMT Hematology Special Care Unit
Product Analysis:  
Total Nucleated Count

Total Nucleated Count is the measurement of the number of nucleated cells and includes white blood cells (WBC) and nucleated red blood cells (NRBCs).

Methodology

Automated analyzer. Can change mode to discount NRBCs. Examples include Sysmex, Coulter, Advia

Manual WBC count – WBCs are counted on a hemocytometer under a microscope.
Why is the TNC important?

TNC x volume yields the total number of nucleated cells in the product. When the % of CD34 positive cells is known, that is used to calculate the total number of stem cells in the product.

A high TNC can be diluted prior to shipment to insure better viability. Several studies have found that hematopoietic stem cell (HSC) products can be stored 48 hours or more without significant loss of viability of CD34+ cells if the products are stored at 4°C and cell concentrations are not too high.
Hematopoietic Progenitor Cells, Marrow HPC(M)

Hematopoietic Progenitor Cells
The good stuff

RBCs
Hematocrit is very high, not the best choice for ABORh Incompatible transplants

NRBCs
Lots. Automated cell counts can ID these, but product analysis doesn’t differentiate

FAT
Shows up as a streak on hemogram
Accurate marrow total nucleated cell (TNC) counts are essential for effective monitoring of bone marrow collection and processing. Aspirated marrow is variably contaminated by fat particles, resulting in overestimation of marrow TNC by automated analyzers.
HPC(M) TNC – What to do?

The TNC during marrow harvest is often higher than the post TNC performed by the CTC.

We compared WBC counts by automated analyzer and Flow Cytometry. Flow counts were lower because prep included washing to remove fat and the antibodies used did not count NRBCs.

Verify what methods your center uses and use it consistently - All manual counts? NRBCs included? Samples washed?
What else effects HPC(M) TNC?

The cell density of a bone marrow harvest positively correlates with donor body weight and peripheral white blood cell count $P = 0.0475$, $P < 0.0001$, but negatively correlated with the total volume of bone marrow harvest $P < 0.0001$. 
Product Analysis: Differential

The differential totals the number of each type of WBC. Can be performed manually or automated.

Lymphocytes
Monocytes
Eosinophils
Basophils
Neutrophils
Why is the Differential Important?

Neutrophils both viable and dead cells, and cellular debris (membranes, granule contents, and cytokines) play a direct causal role in the pathobiology of infusion-related toxicities.

Investigators have suggested a variety of ways to address the issue of toxicity because of high granulocyte content of the cryopreserved PBSC product. At the time of collection, obtaining high-quality apheresis products with minimal contamination by mature myeloid cells is desirable.
Product Analysis: Hematocrit

The Hematocrit is the proportion, by volume, of the product that consists of red blood cells.

Why is the Hematocrit important?
ABO Incompatible transplants. Processing of Major and Bidirectional incompatible transplants can lead to loss of stem cells. The lower the hematocrit, the less likely the need to remove RBCs.
Your best friends help by

Making ISBT 128 Collection labels for the AC and CC

Re-labeling Products for Shipment
You can help your best friends

NMDP VERIFICATION OF HPC, APHERESIS REQUEST

Verify special instructions

Complete FIN number
Your best friends help by

Completing Product Analysis Forms
Faxing forms to Transplant Center and Donor Center ASAP
CIBMTR 2006 Forms

Product Analysis

1. What was the PBSC product volume at the time of analysis?

   _____ • __ mL

Hematology

2. Date of sample collection:

   __ __ __ __ __ __ __ __

3. WBC:

   _____ • __ x 10^9/L

4. Hematocrit:

   ____ • ____ %

5. Platelets:

   _____ _____ x 10^9/L
You can help your best friends

NMDP VERIFICATION OF HPC, APHERESIS REQUEST

Verify Product samples – Most labs do not want a product sample. If they need they can pull directly from bag.
Your best friends help by

Contacting TC about strange requests
  Do you really want 10 mL of product in a purple top?

Consulting with Coordinators
  Regarding special handling instructions
  Regarding T Cell requests
You can help your best friends

DONOR WORKUP REQUEST

Verify fax number is present for CD34 results
Tips to optimize product @
Collection
Minimize RBC Content
Minimize Neutrophils
Shipping
Ship cold
Dilute with Concurrent Plasma, Apheresis
Documentation
Fax info to DC and TC ASAP
Resources

Analysis of the Recovery of Cryopreserved and Thawed CD34+ and CD3+ Cells Collected for Hematopoietic Transplantation
Virginia Fisher, Hanh Khuu, Virginia David-OCampo, Karen Byrne, Steven Pavletic, Michael Bishop, Daniel H. Fowler, A. John Barrett, and David F. Stroncek

Limiting the Daily Total Nucleated Cell Dose of Cryopreserved Peripheral Blood Stem Cell Products for Autologous Transplantation Improves Infusion-Related Safety with No Adverse Impact on Hematopoietic Engraftment
Nandita Khera, Jack Jinneman, Barry E. Storer, Shelly Heimfeld, Megan M.O'Meara, Thomas R. Chauncey, Stephanie J. Lee, Michael Linenberger

Correction of Bone Marrow Nucleated Cell Counts for the Presence of Fat Particles
Stuart A. Bentley, Michael A. Taylor, Donna E. Killian, Susan B. Schoultz, Laura McLannan, Connie A. Bishop, Thomas C. Shea, Mark E. Brecher

Correlation between characteristics of unrelated bone marrow donor and cell density of total nucleated cell in bone marrow harvest.
Kao RH, Li CC, Shaw CK, Wang TF, Chu SC, Chen SH, Yao CY, Huang KP, Wu YF.
Thank you and…

Please reach out if you have questions

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HPCs: Collection, Shipment/Storage, and Processing

Cell Processing Labs, Your Best Friends
NMDP Council Meeting
November 11, 2017

David H. McKenna, M.D.
HPC Graft Sources

Bone Marrow

Peripheral Blood

Umbilical Cord Blood

Centrifugal Separation
Centrifugal force separates cells based on their specific gravity.

Photos from www.fenwalinc.com
Bone Marrow: General

- Original source of HPCs (~1% in marrow)
- OR harvest under general anesthesia
- 10-15 mL/kg recipient weight (target dose 2-4 x 10^8 NCs/kg) = roughly 1L with adult
- Advantages:
  - 1 procedure
  - Lower T cell content
  - Less chronic GVHD than PB
Peripheral Blood: General

- More commonly used than BM (auto/allo)
- Requires mobilization (e.g., G-CSF) and apheresis
- Target dose $5 \times 10^6$ CD34+ cells/kg
- Advantages:
  - No anesthesia/hospitalization
  - More rapid engraftment
  - Possibly less tumor cell contamination (auto)
Umbilical Cord Blood: General

• Collected from placenta
  – OB staff vs. dedicated staff
  – In utero vs. ex utero

• Banked (public vs. private)

• Minimum dose: $1.7-2.0 \times 10^5$ CD34+ cells/kg

• Advantages:
  – No risk to donor
  – Decreased search time
  – Decreased severity of GVHD
  – Reduced HLA match requirements
The characteristics of the HPCs...

- Volume
- NC count/[NC]
- RBC type and content
- Platelet content
- Plasma...

determine the approach to downstream handling...
Bone Marrow: Characteristics

- 1 L total volume
- $2 \times 10^{10}$ TNC
- $20 \times 10^6$ NC/mL
- Hematocrit $\sim 40\% = 400$ mL of RBCs
- Plasma volume $\sim 600$ mL
- Platelets, fat
Peripheral Blood: Characteristics

- 200-300 mL total volume
- $\geq 4 \times 10^{10}$ TNC
- $>200 \times 10^6$/mL
- $<10$ mL RBCs
Umbilical Cord Blood: Characteristics

- 25 mL total volume
- 1-2 x $10^9$ TNC
- 60 x $10^6$ NC /mL
- <5 mL of RBCs
- 10% DMSO
Shipment/Storage
BEST Transportation Survey

• 194 respondents, 90% shipped or received CT products
• 82% specified the conditions for temperature in transit
• 57% monitored temperature in transit
  – 74% of these used a data logger
• Temperature range most commonly specified was 18-24 °C
• Survey respondents indicated a wide range of shipping temperatures and most indicated ‘no adjustment required’ of cell concentration for Therapeutic Cells (e.g., DLI)

Validation of short-term handling and storage conditions for marrow and peripheral blood stem cell products

Grace S. Kao, Haesook T. Kim, Heather Daley, Jerome Ritz, Scott B. Burger, Linda Kelley, Cynthia Vierra-Green, Sue Flesch, Stephen Spellman, John Miller, and Dennis Confer

BACKGROUND: Allogeneic hematopoietic stem cell transplants from unrelated donors are routinely used in the treatment of patients with hematologic malignancies. These cellular products are often collected off-site and require transport from the collection site to transplantation centers. However, the effects of transport conditions and media on stem cell graft composition during short-term storage have not been well described.

STUDY DESIGN AND METHODS: Five bone marrow (BM), four filgrastim-mobilized peripheral blood stem cell (PBSC), and four nonmobilized peripheral blood mononuclear cell (PBMC) products were collected from healthy volunteer donors and stored at 4 or 20°C for up to 72 hours in 10% PlasmaLyte A plus anticoagulants such as 10% acid citrate dextran-A (ACD-A) and/or 10 IU/mL heparin. Products were evaluated at 0, 24, 48, and 72 hours for cellular content, viability, and metabolic activities.

RESULTS: BM products maintained equivalent cell viability when stored at either 4 or 20°C over 72 hours, but cell viability was better maintained for PBSC products stored at 4°C. The mean viable CD34+ cell recovery for PBSC and BM products stored over 72 hours at 4°C was higher than 75%. Significantly lower CD34+ cell and colony-forming unit recoveries were seen in PBSC products but not BM products stored at room temperature. Faster lactic acid accumulation was observed in PBMC and PBSC products stored without ACD-A.

CONCLUSIONS: Seventy-two-hour storage of BM, PBSC, and PBMC products at refrigerated temperature maintains optimal cell viability and recovery. Anticoagulation with ACD-A is preferred over heparin to reduce lactic acid accumulation in the product media.

Transfusion (2011); 51: 137–147.
Validation of short-term handling and storage conditions for marrow and peripheral blood stem cell products

Grace S. Kao, Haesook T. Kim, Heather Daley, Jerome Ritz, Scott R. Burger, Linda Kelley, Cynthia Vierra-Green, Sue Flesch, Stephen Spellman, John Miller, and Dennis Confer

Transfusion (2011); 51: 137–147.
Collections maintained at 4°C retained higher TNC counts, MNC counts and CD45+ cell viability over a 72-96 hr storage period.

Recommend cool storage and processing in <48 hours (ASAP)

Non-Mobilized Apheresis MNC
raw material for...

- Donor lymphocyte infusion
- CAR-T cells
- Viral-specific T cells
- Etc…

NK cells

Treg cells

Dendritic cell photo credit: Celluzzi C and Welbon C. Transfusion (2003); 43 (4).
Previous Studies of Non-mobilized MNC Apheresis Collections

• Single center studies
• Small ‘n’
  – typically more focused on mobilized apheresis
• Cell concentration
  – often not modified
• Storage solutions
  – typically just anticoagulant
• Type of bag
  – Transfer bag (non-breathable) vs apheresis bag (breathable)
Optimization of Storage Conditions for Apheresis Research (OSCAR)

• 4 centers: n = 15

- Temperature
- Solution
- Concentration
- Content
- Time

PB MNC
Average = 1.15 x 10^7 TNC (N=15)

4°C

- 3.8 x 10^7 TNC
- 100 million/mL
- 300 million/mL

RT
3.8 x 10^6 TNC

- 300 million/mL
- 100 million/mL

Testing at each time point:
- Visual
- TNC
- MNC (diff)
- Platelet count?
- Hematocrit?
- Viability
- Flow cytometry
  - CD3/CD4/CD8/
  - CD14/CD19/CD20/
  - CD25/CD56
- Other

Time points:
T=0
T=24h
T=48h
T=72h

TJ Gniadek, HSP Garrityen, D Stroncen, ZM Szczepiorkowski, DH McKenna. Optimal Storage Conditions for Apheresis Research (OSCAR): A Biomedical Excellence for Safer Transfusion (BEST) Collaborative Study. Accepted for publication in Transfusion.
Participating Centers

• National Institutes of Health, Bethesda, MD (D. Stroncek)
• Dartmouth-Hitchcock Medical Center, Lebanon, NH (Z. Szczepiorkowski)
• Institut für Klinische Transfusionsmedizin, Braunschweig, Germany (H. Garritsen)
• University of Minnesota, Mpls/Saint Paul, MN (D. McKenna)
Results

• Visual –
  – Cold (HT and HSA) – OK
  – RT (HSA) –
    • 300M/mL small aggregates at 72h (NIH1)
    • 300M/mL clots at 48h and 72h (MN3)
    • 300M/mL “clumpy” at 72h (Dart1)
    • 300M/mL “funky!” at 48h (Dart3)
    • 100M/mL clots at 48h and 72h (MN3)
All products, all sites. Average viability versus time

0 hours

24 hours

48 hours

72 hours

TJ Gniadek, HSP Garritsen, D Stroncek, ZM Szczepiorkowski, DH McKenna. Optimal Storage Conditions for Apheresis Research (OSCAR): A Biomedical Excellence for Safer Transfusion (BEST) Collaborative Study. Accepted for publication in Transfusion.
Summary

• Aggregates/clumping most noted at RT and higher cell concentration (300 M/mL) in HSA
• Cold temperature storage is best for non-mob MNC
  – Evident by 24 hrs
• Cell concentration becomes a factor by 24 hrs at room temperature and 48 hrs at cold temperature
Cell Processing
Why manipulate an HPC graft?

- Red cells
- Plasma
- CD34+ cells
- T cells
- B cells
- NK cells

Image courtesy of knnt at www.FreeDigitalPhotos.net
## Routine Cell Processing Methods

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Volume reduction (plasma depletion)</td>
<td>Reduction of incompatible plasma (minor ABO mismatch); Prevention of volume overload in recipient; Concentration of cells for cryopreservation</td>
</tr>
<tr>
<td>Red blood cell depletion</td>
<td>Reduction of incompatible red cell (major ABO or other antigen mismatch); Maximization of storage space; Limitation of infusion of lysed red cells and free hemoglobin (cryopreserved products)</td>
</tr>
<tr>
<td>Buffy coat preparation</td>
<td>Maximization of storage space; Debulking of red cells prior to further manipulation</td>
</tr>
<tr>
<td>Thawing, washing, and filtration</td>
<td>Preparation of HSC products prior to infusion</td>
</tr>
</tbody>
</table>

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The lab is integral in guiding patient care...

~ Patient Safety
~ Quality Improvement
~ Process Improvement
Personal experience…
Assessment of UCB Bag Breaks

Loss of integrity of umbilical cord blood unit freezing bags: description and consequences

Bharat Thyagarajan, Michael Berger, Darin Sumstad, and David H. McKenna, Jr

LETTER TO THE EDITOR

Postthaw filtration of umbilical cord blood does not affect product quality or likelihood of engraftment

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<table>
<thead>
<tr>
<th>TABLE 1. Summary of change in product QC testing after filtration (postfilter value minus prefiltro value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>QC testing</td>
</tr>
<tr>
<td>TNC dose (x10^9/Lg)</td>
</tr>
<tr>
<td>CD34 dose (x10^6/Lg)</td>
</tr>
<tr>
<td>CFU colonies per million cells plated</td>
</tr>
<tr>
<td>Viability (%)</td>
</tr>
</tbody>
</table>

Umbilical Cord Blood Bank Qualification

University of Minnesota Fairview Cell Therapy Cord Blood Bank Qualification Process

- Complete Comprehensive Survey
- Cord Blood Bank AABB or FACT Accredited
- CBUs Received Previously? (>1)
  - YES: Complete Short Survey
  - NO: QC Acceptable?
    - YES: Get 1 QC Unit
    - NO: QC Acceptable?
      - YES: Survey Acceptable
      - NO: QC Unit Acceptable?
        - YES: BANK QUALIFIED
        - NO: On Going Monitoring

Survey Acceptable

- QC Acceptable?
  - YES: Get 1 QC Unit
  - NO: QC Unit Acceptable?
    - YES: BANK QUALIFIED
    - NO: BANK DISQUALIFIED

- QC Acceptable?
  - YES: Get 1 QC Unit
  - NO: QC Unit Acceptable?
    - YES: BANK QUALIFIED
    - NO: BANK DISQUALIFIED

KEY
CBU = Cord Blood Unit
QC = Quality Control
FACT = Foundation for the Accreditation of Cellular Therapy

On Going Monitoring:
Adverse cord blood bank or product post-qualification findings that could impact future cord blood products.


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Detection of Mislabeled UCB Units

Mislabeled units of umbilical cord blood detected by a quality assurance program at the transplantation center

Jeffrey McCullough,1,2 David McKenna,1 Diane Kadidlo,3 David Maurer,1 Hamielt J. Noreen,4 Kathy French,5 Claudio Brunstein,1 and John E. Wagner1

1Department of Laboratory Medicine and Pathology, 2Institute for Engineering in Medicine, and 3Academic Health Center, 4University of Minnesota Medical Center, Fairview, and 5Blood and Marrow Transplant Program and Departments of 1Medicine and 3Pediatrics, University of Minnesota, Minneapolis

We instituted procedures to check the identity of cord blood unit provided for transplantation by carrying out ABO and human leukocyte antigen (HLA) typing of the thawed units before transplantation. ABO typing is done using standard techniques. Rapid HLA class I serology is with monoclonal antibody trays (One Lambda Inc) using standard incubations. One mislabeled umbilical cord blood (UCB) unit was detected on the day of intended transplantation by repeat ABO typing of the thawed unit at our transplantation center. Because ABO typing will not detect all labeling errors, the rapid serologic class I HLA typing procedure was done on thawed units just before transplantation for all units without an attached segment. This procedure identified a second mislabeled unit. In a 8-year period, 2 of 871 (0.2%) cord blood units sent to us for transplantation were mislabeled and potentially would have been transplanted incorrectly. This error rate of 1 per 249 (0.4%) patients could have potentially devastating consequences. (Blood. 2009; 114:1664-1668)
Guiding Patient Care...

Development and operation of a quality assurance system for deviations from standard operating procedures in a clinical cell therapy laboratory

D McKenna, Jr1, D KadiYo2, D Sumstad2 and J McCullough1,2
1Department of Laboratory Medicine and Pathology, Division of Transfusion Medicine, University of Minnesota Medical School, Minneapolis, MN, USA
2Cell Therapy Clinical Laboratory, Fairview-University of Minnesota Medical Center, Saint Paul, MN, USA


Cell loss and recovery in umbilical cord blood processing: a comparison of post thaw and postwash samples

Vincent Laroche, David H. McKenna, Gary Moroff, Therese Schierman, Diane KadiYo, and Jeffrey McCullough

TRANSPLANTATION AND CELLULAR ENGINEERING

Issues in the quality of umbilical cord blood stem cells for transplantation

Jeffrey McCullough, David McKenna, Diane KadiYo, Therese Schierman, and John Wagner

TRANSFUSION 2005;45:832-841.


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Collection*

*if time permits
Rate/Impact of Contamination


– Retrospective analysis of 2,935 HSCs (1990-2004)
– 36/2,935 (1.2%) contaminated
  • See table (next slide) for breakdown
– Coag-neg Staph (19)
– One death day +7 post tx (Pseudomonas cepacia)
– No additional adverse sequelae

Rate/Impact of Contamination

Table 1. Microbially Contaminated Stem Cell Products

<table>
<thead>
<tr>
<th>HSC Product</th>
<th>Preprocessing*</th>
<th>Postprocessing*</th>
<th>At Thaw*</th>
<th>Total</th>
<th>Total HSC Products†</th>
<th>Incidence of Contamination (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BM</td>
<td>13</td>
<td>9</td>
<td>1</td>
<td>22</td>
<td>1666</td>
<td>1.3</td>
</tr>
<tr>
<td>Allogeneic</td>
<td>10</td>
<td>5</td>
<td>0</td>
<td>15</td>
<td>1257</td>
<td>1.2</td>
</tr>
<tr>
<td>Autologous</td>
<td>3</td>
<td>4</td>
<td>1</td>
<td>8</td>
<td>409</td>
<td>2.0</td>
</tr>
<tr>
<td>PBSC</td>
<td>4</td>
<td>2</td>
<td>0</td>
<td>6</td>
<td>919</td>
<td>0.7</td>
</tr>
<tr>
<td>Allogeneic</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>296</td>
<td>0.3</td>
</tr>
<tr>
<td>Autologous</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>5</td>
<td>623</td>
<td>0.8</td>
</tr>
<tr>
<td>UCB</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Related</td>
<td>3</td>
<td>4</td>
<td>0</td>
<td>7</td>
<td>350</td>
<td>2.0</td>
</tr>
<tr>
<td>Unrelated</td>
<td>0</td>
<td>2</td>
<td>0</td>
<td>2</td>
<td>332</td>
<td>0.6</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>15</td>
<td>1</td>
<td>36</td>
<td>2935</td>
<td>1.2</td>
</tr>
</tbody>
</table>

HSC indicates hematopoietic stem cell; BM, bone marrow; PBSC, peripheral blood stem cell; UCB, umbilical cord blood.
*Phase in processing when contamination occurred.
†Total number of the type of product infused at our center during study period.

Rate/Impact of Contamination

• Padley D, et al (Transfusion 2007):
  – 119/7,233 (1.6%) contaminated
    • See table (next slide) for breakdown
  – Coag-neg Staph (73)
  – No adverse sequelae
Rate/Impact of Contamination
Padley D, et al (Transfusion 2007)

<table>
<thead>
<tr>
<th>Product</th>
<th>Contamination rate</th>
<th>Excluding culture-positive donors†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apheresis PBPCs or DLI</td>
<td>111/6975 (1.6)</td>
<td>80/6944 (1.2)</td>
</tr>
<tr>
<td>Marrow</td>
<td>8/258 (3.1)</td>
<td>7/257 (2.7)</td>
</tr>
<tr>
<td>Total</td>
<td>119/7233 (1.6)</td>
<td>87/7201 (1.2)</td>
</tr>
</tbody>
</table>

* Data are reported as number (%).
† Excluding products collected from donors that had documented positive cultures at the time of collection.

Rate/Impact of Contamination
Padley D, et al (Transfusion 2007)

**TABLE 2. Organisms isolated from HPC products**

<table>
<thead>
<tr>
<th>Organisms</th>
<th>Isolates</th>
<th>Total</th>
<th>Autologous</th>
<th>Allogeneic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coagulase negative staphylococci</td>
<td>73</td>
<td>57</td>
<td>49</td>
<td>8</td>
</tr>
<tr>
<td>Staphylococcus aureus</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Coagulomonas sp.</td>
<td>7</td>
<td>5</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Enterococcus faecalis</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>Acinetobacter sp.</td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Moraxella sp.</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Micrococcus sp.</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
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<td>Other anaerobic bacteria</td>
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</table>

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Darin Sumstad
Lisa VanOrsow
Nancy Bostrom
Sheryl Adams
Cindy Stanaway
Lien Le
Molly Growe
Anh Do
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Michelle Lucio
Julie LaTour

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Maria Opitz
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Administrative &
Support Staff

Thank you!

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    • Reduce errors by ensuring legibility

For more info reach out to the AC/CC Team
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Evaluation Reminder

Please complete the Council Meeting 2017 evaluation in order to receive continuing education credits and to provide suggestions for future topics.

We appreciate your feedback!