

Stem Cell Infusion

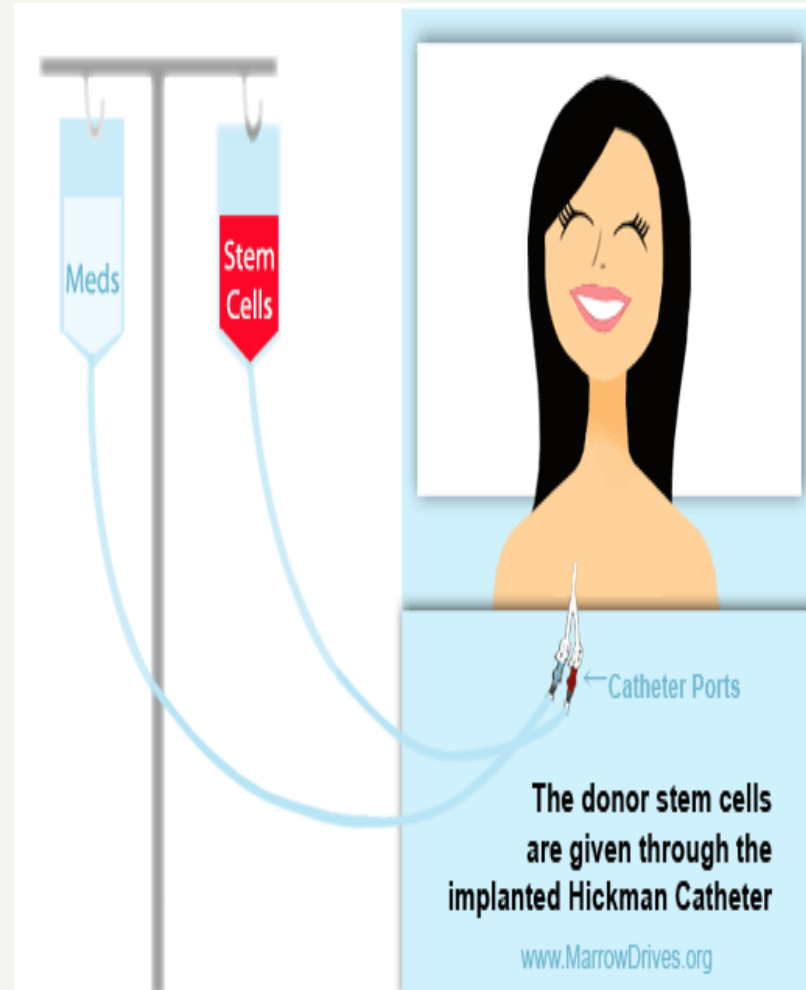
Presented by: Ghufraan Hawaj, MSN

Outlines

- Sources of Stem cells
- Infusion of cryopresed vs fresh stem cell
- Nursing care pre, during& after infusion
- Engraftment

What a nurse should do on day zero?

- Do I have to pre-hydrate and pre medicate patients before infusion?
- What is the rate of stem cell infusion?
- What is the maximum dose if DMSO?
- Can I use filter when I infuse stem cell?
- Can I infuse stem cells from ABO incompatible donor?
- When should I expect engraftment?

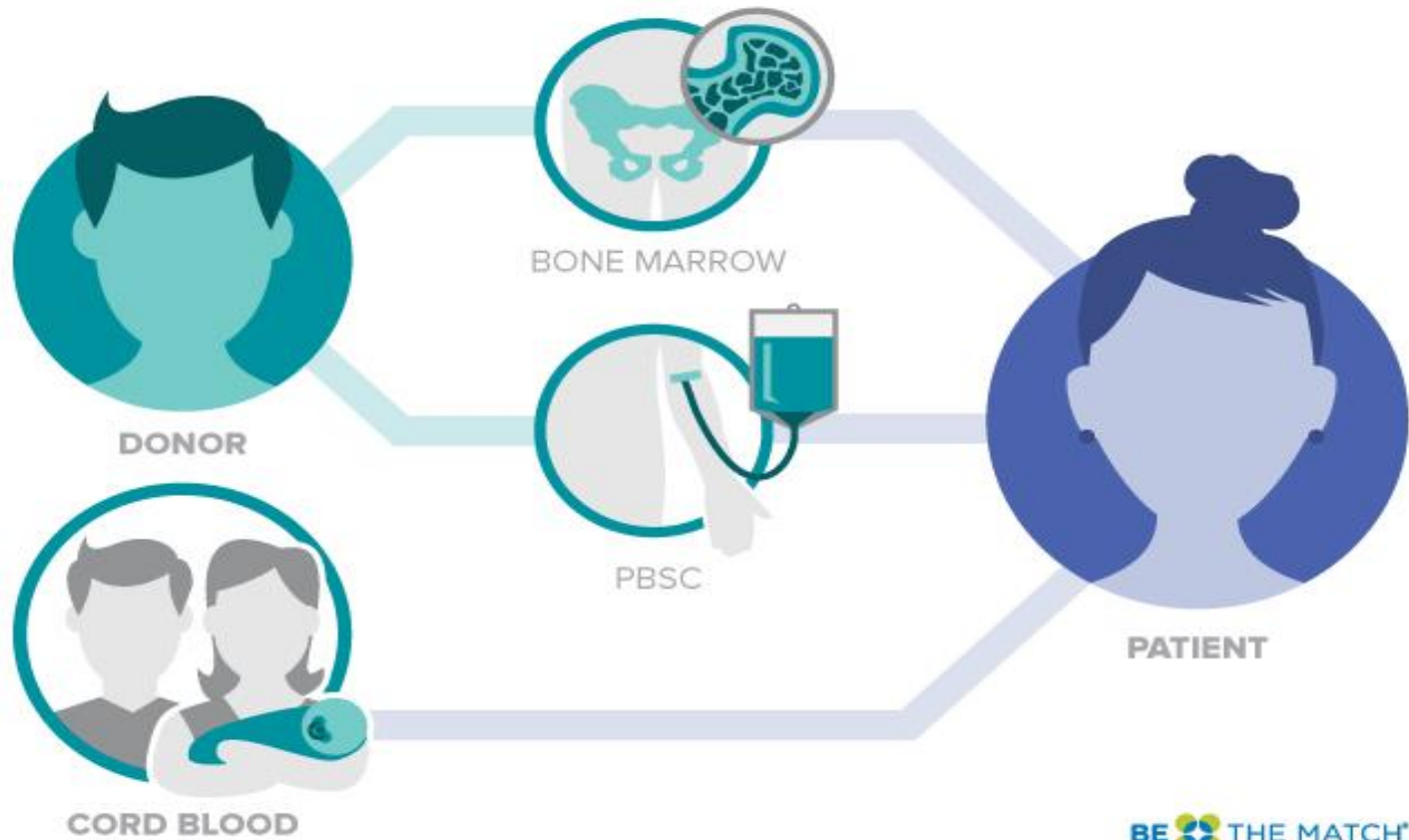


Patient care during infusion of hematopoietic progenitor cells

Annette Sauer-Heilborn, Diane Kadidlo, and Jeffrey McCullough

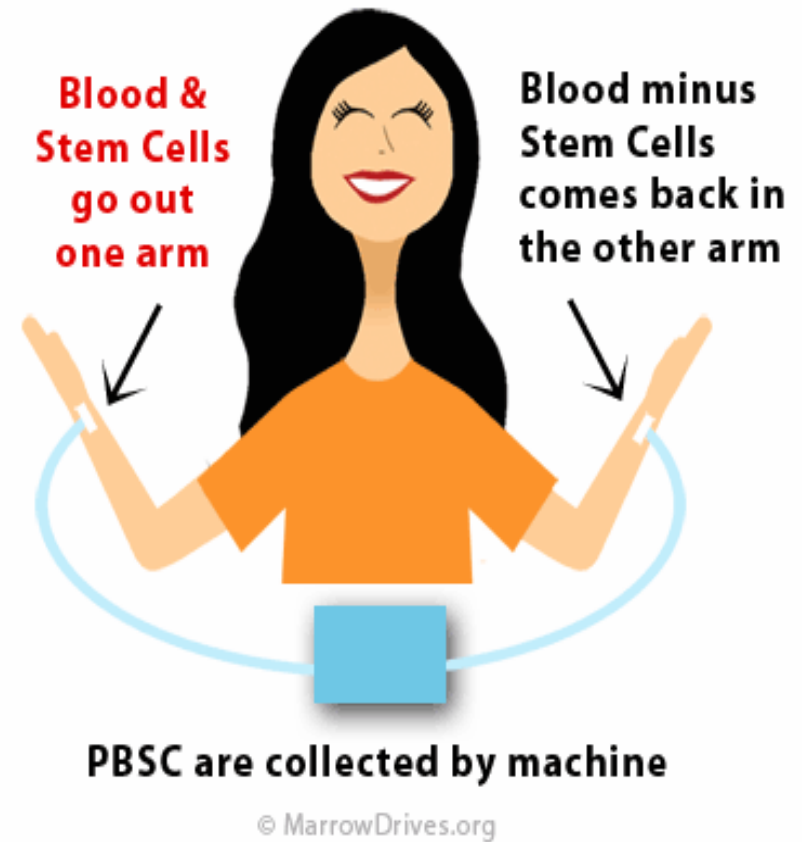
Sources of stem cell

3 ways to donate marrow:



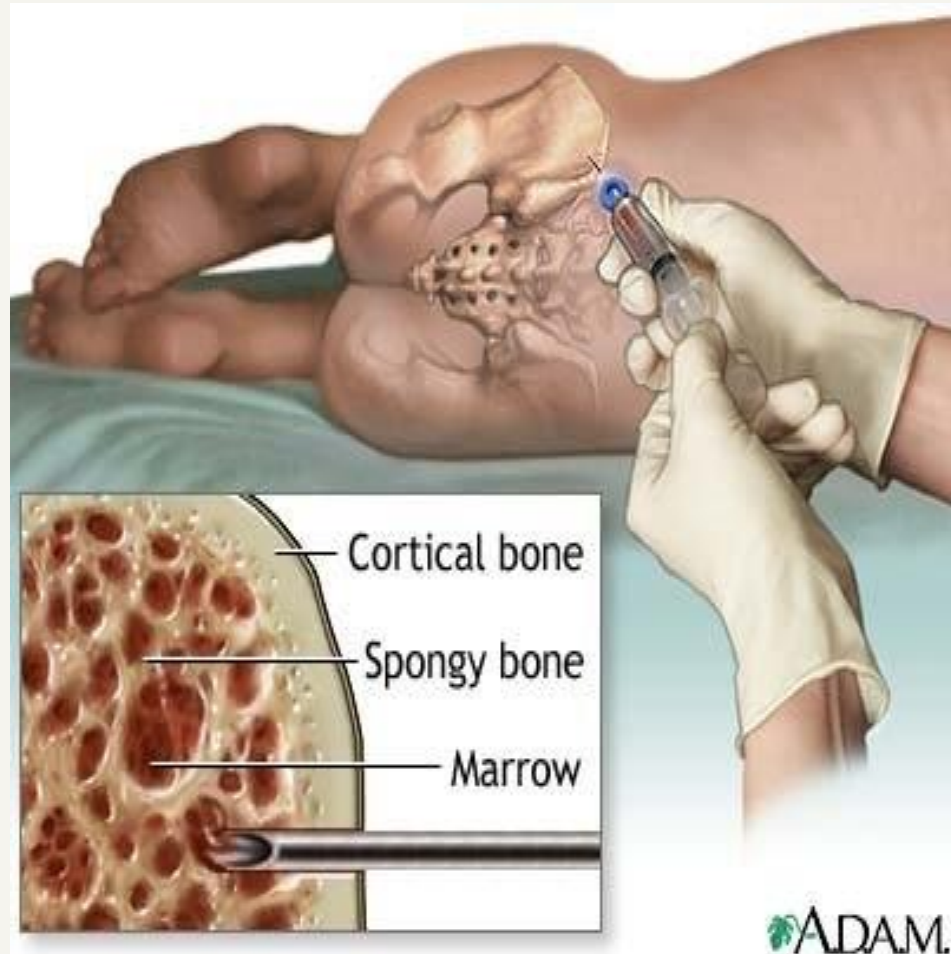
Sources of stem cell

- Peripheral stem cell



Sources of stem cell

- Bone marrow



Sources of stem cell

- Cord blood



Cryopreserved stem cells

- Slow cooling, Stored at -196 degree in vapor phase of liquid nitrogen
- DMSO is added as cryoprotectant store stem cell



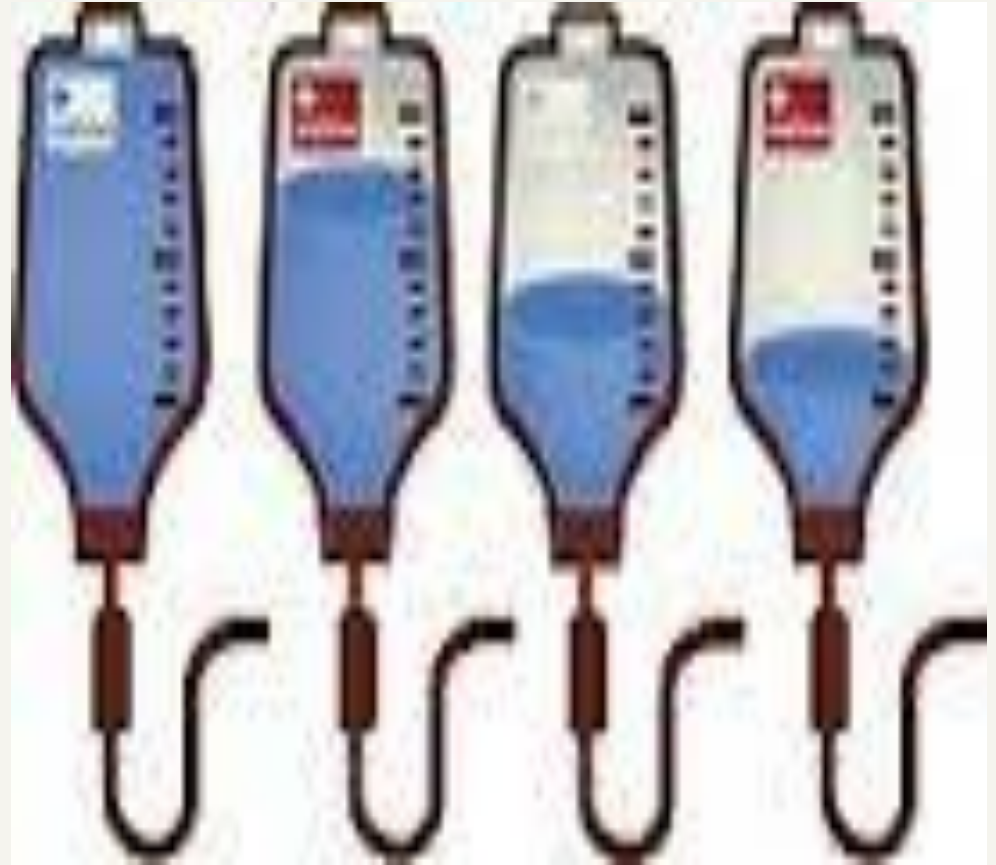
Infusion of Cryopreserved PBSC/ Cord

- Pre hydration (44% of DMSO excreted by kidney)



Infusion of Cryopreserved PBSC/ Cord

- Pre medication:
 - Antihistamine
 - Corticosteroid
 - Antipyretic
 - Anti-emetic



Infusion of Cryopreserved PBSC/ Cord

- Prime tubing with normal saline



Infusion of Cryopreserved PBSC/ Cord

- Infusion through filter size= >170 mico



Infusion of Cryopreserved PBSC/ Cord

- Infusion rate 20-30 min for un washed
- 45-60 min for washed
- Max dose of dmso is 1ml/kg/day



Infusion of Cryopreserved PBSC/ Cord

- Pre hydration (44% of DMSO excreted by kidney)
- Pre medication: antihistamine, corticosteroids, antipyretic, & anti emetic (DMSO side effects)
- Prime tubing with normal saline
- Infusion through filter size+ >170 mico
- Thawing in 37 degree water bath
- Infusion rate 20-30 min for un washed
- 45-60 min for washed



Nursing care

- Patient observation pre, during and post infusion
- Check patency of iv line
- Observe for side effects
 - Nausea& vomiting
 - Headache& dizziness
 - Hypotension& anaphylactic reaction (DMSO induce histamine release)

How to manage infusion reaction?

- Stop infusion
- Manage symptoms
- Give reaction meds as prescribed
- Close observation
- Resume infusion at slower rate

What if life threatening side effects happen?

- If severe or life threatening dmsso related side effects happen, dmsso can be washed by lab tech.
- Cells will be diluted in saline + acid citrate dextrose anticoagulant, then placed in cell washer



ORIGINAL ARTICLE

Recovery, viability and clinical toxicity of thawed and washed haematopoietic progenitor cells: analysis of 952 autologous peripheral blood stem cell transplantations

E Foïs^{1,9}, M Desmartin^{2,9}, S Benhamida², F Xavier², V Vanneaux¹, D Rea¹, J-P Femand³, B Arnulf³, N Mounier⁴, M Ertault⁴, J-P Lotz⁵, L Galicier⁶, E Raffoux⁷, M Benbunan¹, J-P Marolleau⁸ and J Larghero¹



Fresh stem cell

- Pre hydration is not required unless ABO Major incompatibility (should be RBC Depleted to RBC content less than 15ml)
- Pre medication
- Infusion rate
- Monitor intake and output
- Diuretics if needed

HOW DO I . . . ?

CME

How do I approach ABO-incompatible hematopoietic progenitor cell transplantation?

Jennifer Daniel-Johnson and Joseph Schwartz

Major

Definition	<ul style="list-style-type: none">• Recipient isoagglutinins (anti-A, anti-B, anti-A,B) incompatible with donor RBCs
Donor-recipient ABO pairs	<ul style="list-style-type: none">• Group A, B, and AB donor and Group O recipient• Group AB donor and group A or B recipient
Potential adverse consequences	<ul style="list-style-type: none">• Immediate hemolysis• Delayed RBC engraftment• PRCA
Recommended interventions	<ul style="list-style-type: none">• RBC reduction if >30 mL RBC and/or if recipient isoagglutinin titers >32• Transfuse ABO appropriate blood products
Additional or alternate interventions that may be performed	<ul style="list-style-type: none">• Recipient's isoagglutinins removal before transplantation via TPE or immunoadsorption

Minor

- Recipient RBCs incompatible with donor isoagglutinins.
 - Group O donor and group A, B, or AB recipient

 - Immediate hemolysis
 - Passenger lymphocyte syndrome causing delayed hemolysis
 - Plasma reduction
 - Close clinical and laboratory observation, between Days +5 and 15 after HPC transplantation for hemolysis (e.g., Hb/Hct, LDH, bilirubin, hemoglobinemia)
Transfuse ABO appropriate blood products
 - Replacement of recipient RBCs with donor type via RBC exchange (rarely), rituximab
-

Bidirectional

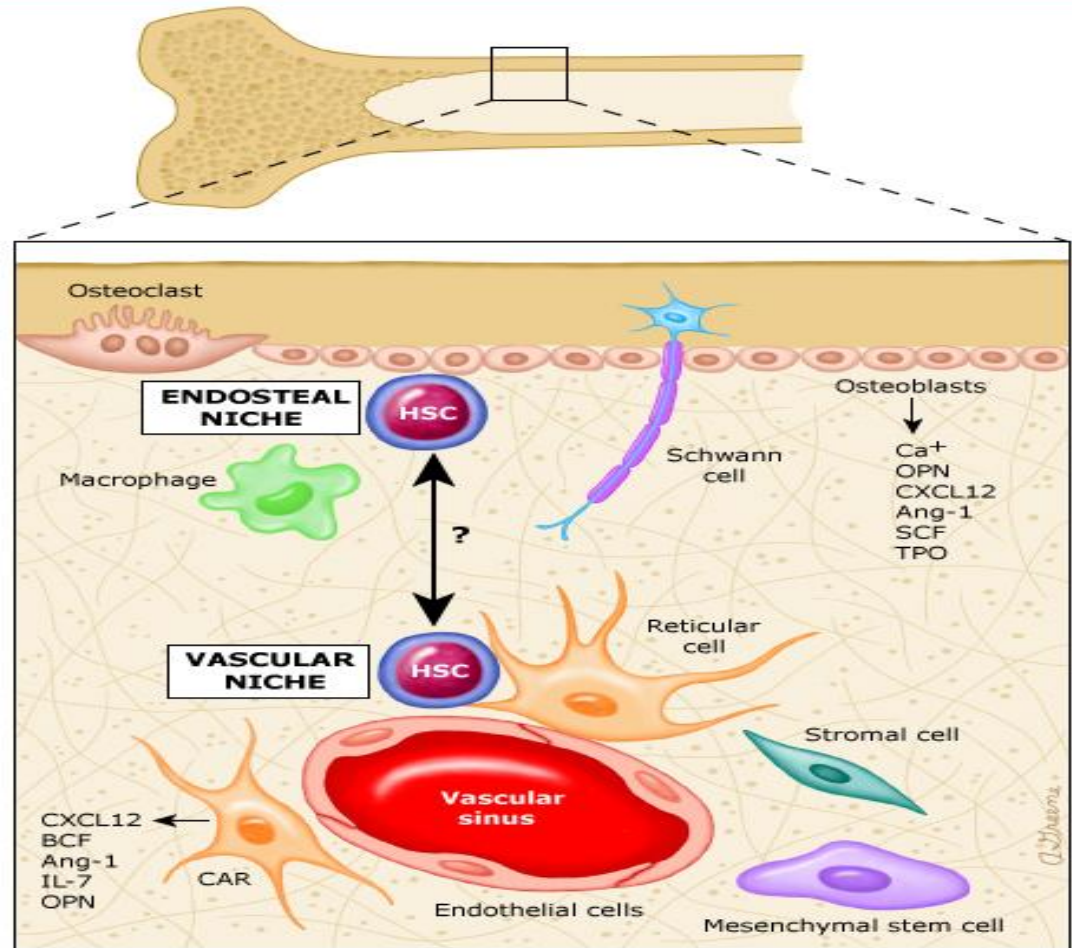
- Combination of both incompatibilities
- Group A donor and B recipient
- Group B donor and A recipient
- Combination of potential adverse consequences seen with major and minor incompatibility
- Combination of interventions used for major and minor incompatibility

- Combination of interventions used for major and minor incompatibility



Engraftment

Hematopoietic stem cell niches



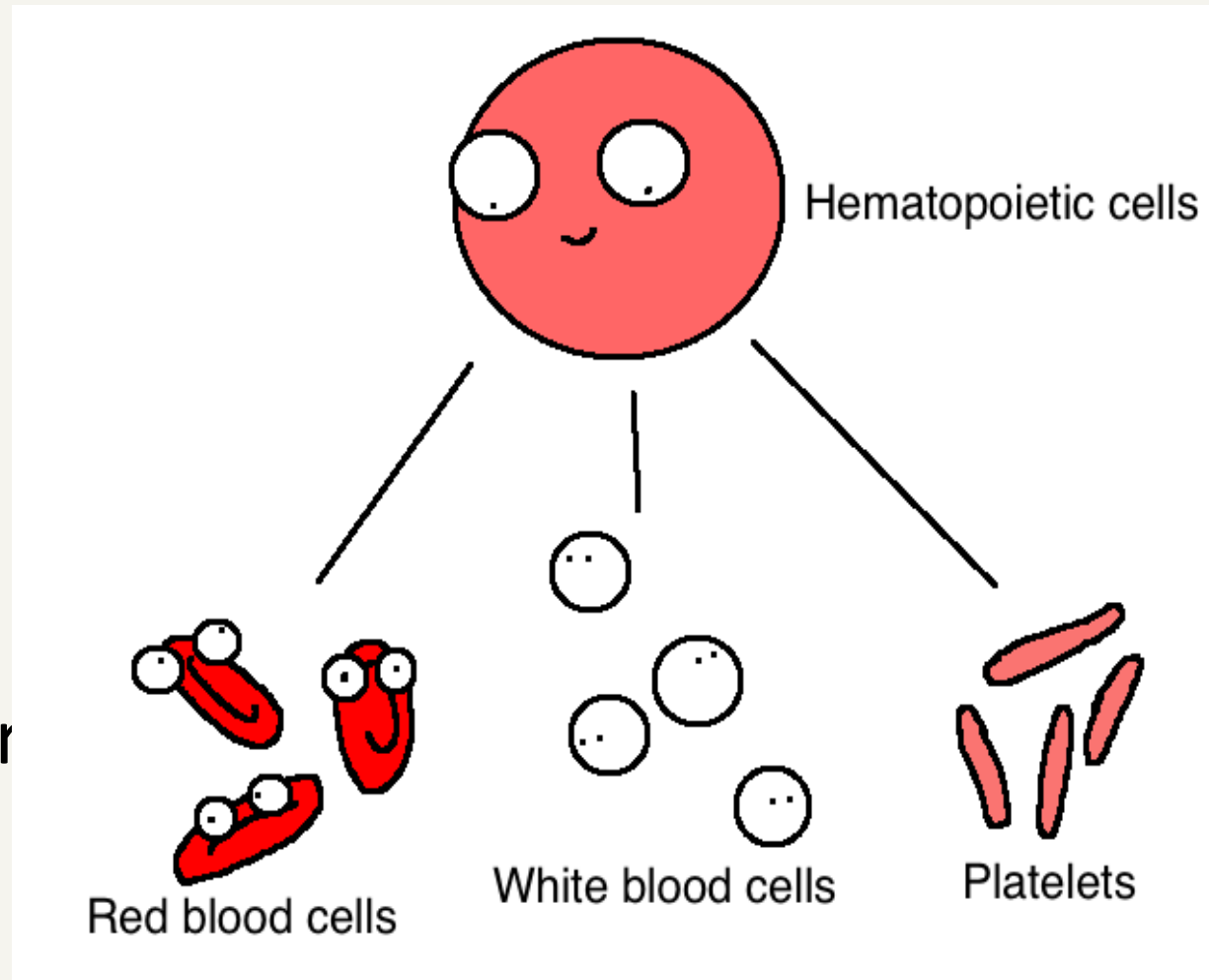
The graphic depicts endosteal and perivascular niches for hematopoietic stem cells (HSCs); it is not known whether HSCs migrate between these niches. The niches regulate HSC quiescence, self-renewal, mobilization, and differentiation. Cell-cell contact, secreted cytokines, and extracellular matrix (ECM) factors all play roles. Some of the secreted factors are shown. ECM factors include fibronectin, hyaluronic acid, collagen, laminin, glycosaminoglycans, heparan sulfate, and chondroitin sulfate.

CAR: CXCL12-abundant reticular cell.

Based on a figure created by Colin A Sieff, MB, BCh, FRCPath.

Engraftment

- Neutrophils
- hg
- Plt
- Chimerism/
- FISH to monitor engraftment



Supportive care before engraftment

- Daily labs
- Transfusion as required
- Gcsf (for auto)
- Isolation in positive pressure room with hepa filter
- Prophylactic antiviral, antifungal, ?antibacterial

References

- Negrin, R. Sources of hematopoietic stem cells. Up to date. 2015
- Fois et al. recovery, viability and clinical toxicity of thawed and washed hematopoietic progenitor cell. (2007). Bmt . (40) 831-835.
- [Benekli M](#), [Anderson B](#), [Wentling D](#), [Bernstein S](#), [Czuczman M](#), [McCarthy P](#). Severe respiratory depression after dimethylsulphoxide-containing autologous stem cell infusion in a patient with AL amyloidosis. (2000). BMTJ. 25(12):1299-1301
- Rowely et al. Transplantation of ABO incompatible Bone marrow and peripheral stem cell components. (2000). Bone marrow transplantation. (26) 749-757.
- Higam et al. Reversible leukoencephalopathy associated with re infusion of DMSO Preserved stem cells. (2000). 26, 797-800



*Thank you
for your attention*

Any questions?