



Transfusion Support of ABO Incompatible Stem Cell Recipients

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Objectives

- Provide an understanding for the selection of blood products for ABO incompatible stem cell recipients
- Briefly discuss a case of non-ABO incompatibility





Transfusion Requirements

- Autologous recipients
 - No issue with decision of ABO selection
 - All cellular products should be irradiated for 1-year post transplant
 - Apheresis or pooled platelets
- Allogeneic recipients
 - Select blood group compatible with both recipient and donor group
 - All cellular products irradiated for life
 - Apheresis platelets





ABO Incompatibility

- 40 - 50% of allogeneic HSCT have an ABO incompatibility
- Variable and inconsistent data regarding the affect on overall patient survival, graft rejection or GVHD
- Major – Minor – Major/Minor





Major Incompatible Introduction of novel ABO antigen

Group O recipient / group A, B or AB donor

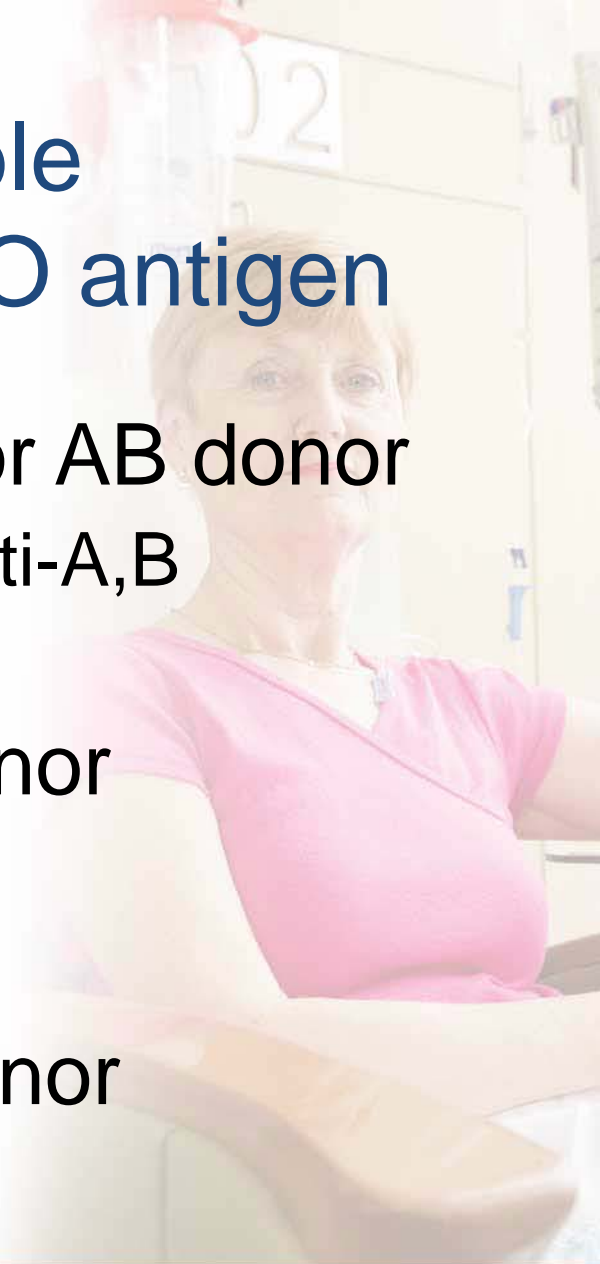
– Recipient: Anti-A, Anti-B and Anti-A,B

Group A recipient / group AB donor

– Recipient: Anti-B

Group B recipient / group AB donor

– Recipient: Anti-A





Major ABO Incompatible Transplant

Risk of hemolytic transfusion reaction during the stem cells infusion

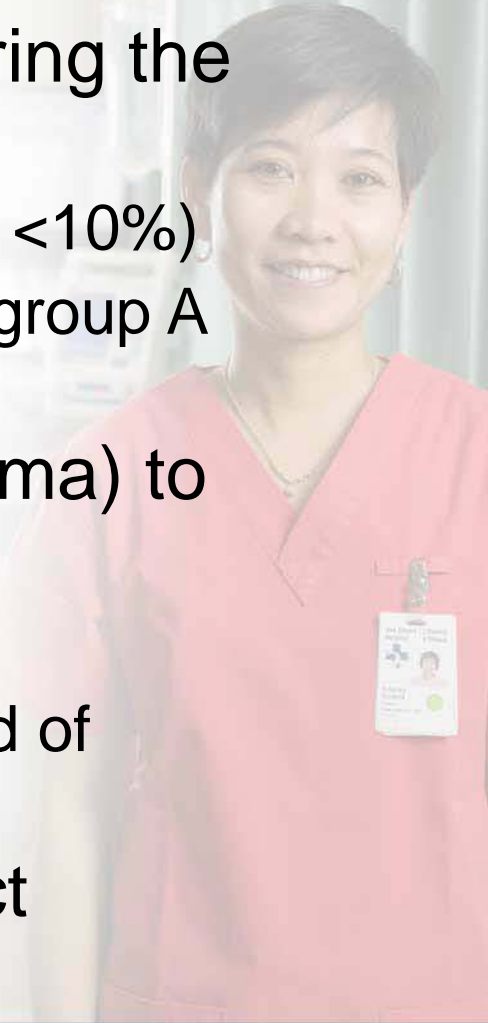
- More risk with BM product than PBSC (hct <10%)
- More common with group O recipient and group A donor

Recipient plasma exchange (5% Alb/plasma) to reduce anti-A or anti-B

- Target: 4 for anti-A; 8 for anti-B
- BUT! Titre doesn't express avidity; rebound of antibody?

Red cell depletion of the stem cell product

- BUT! Impact on quality of product?



Patient 1

- 60 year old male
- CLL
- Group O
- Unrelated Group A **bone marrow** donor
- Baseline anti-A titre = 1024 (IAT)
- Plasma exchange; 5% alb





Patient 1

Exchange	5% Albumin	Anti-A titre IAT
		1024
1	4L	64
2	4L	32
3	4L	32
4	4L	16

Patient 1

- Admitted to BMT unit
- No manipulation to product
- Patient well hydrated
- Slow infusion to start
- Patient eating lunch within the hour





Patient 1: ABO Testing

Recipient: O Donor: A

Day	Anti-A	Anti-B	A ₁ cells	B cells
1	2MF	0	0	4
7	2MF	0	2	4
38	4MF	0	1	4
93	4	0	0	4
390	4	0	0	4



Major ABO-Incompatible Transfusion Support from Transplant to Engraftment

Recipient	Donor	RBCs	Plasma/ Platelets
O	A	O	A, AB
	B		B, AB
	AB		AB
A	AB	A/O	AB
B	AB	B/O	AB



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NODE:TOHHNA-1725 ENV:015 USERNAME:Jennifer Oneil
```

```
P A T I E N T      C O M M E N T      (PTC)                                GROUP/TYPE 0  POS
```

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MED NBR (09001)95-182544-7      NAME BB, BMT/STEM CELLS PT  
DEPT      0001 LABORATORY      SECT 700 TRANSFUSION MEDICINE  
H.A. CODE  
TECH
```

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ANTIBODIES:  IRR
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10/04/29 11:29
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***** ALLO BMT ON MAY 5TH 2010 ***** ^  
DONOR: MICKEY MOUSE GROUP: A POSITIVE ^  
GIVE IRRADIATED RED CELLS: GROUP O POSITIVE ^  
GIVE APHERESIS IRRADIATED PLATELETS: GROUP A ^  
GIVE GROUP A OR AB PLASMA PRODUCTS ^  
* * * end of data * * *
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Minor Incompatible Introduction of novel ABO antibody

Group A, B or AB recipient / group O donor

– Donor: Anti-A, Anti-B, Anti-A,B

Group AB recipient / group A donor

– Donor: Anti-B

Group AB recipient / group B donor

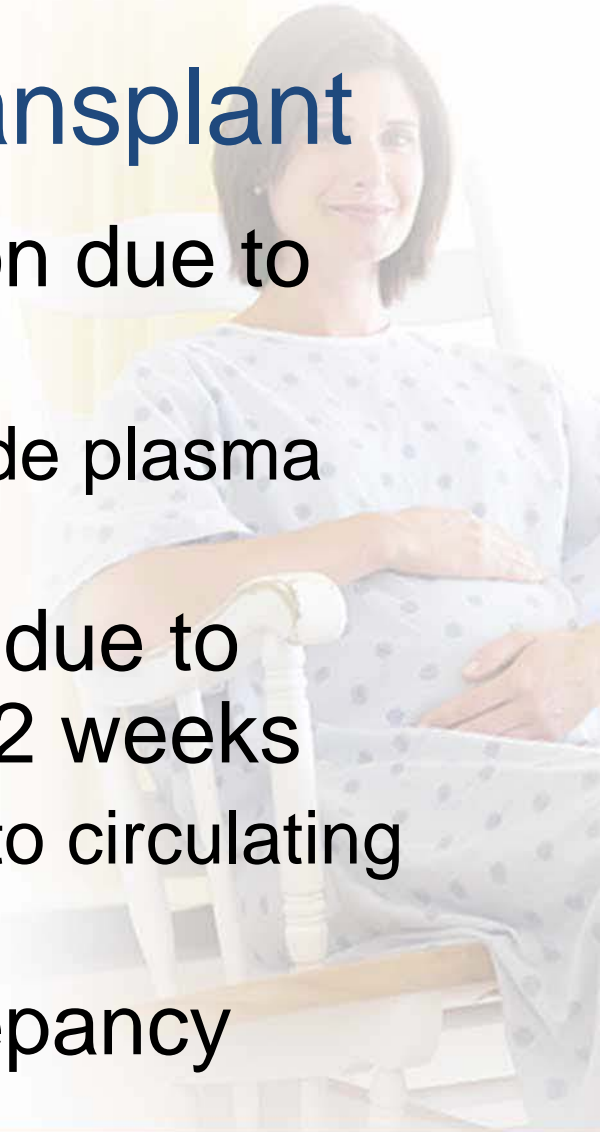
– Donor: Anti-A





Minor Incompatible Transplant

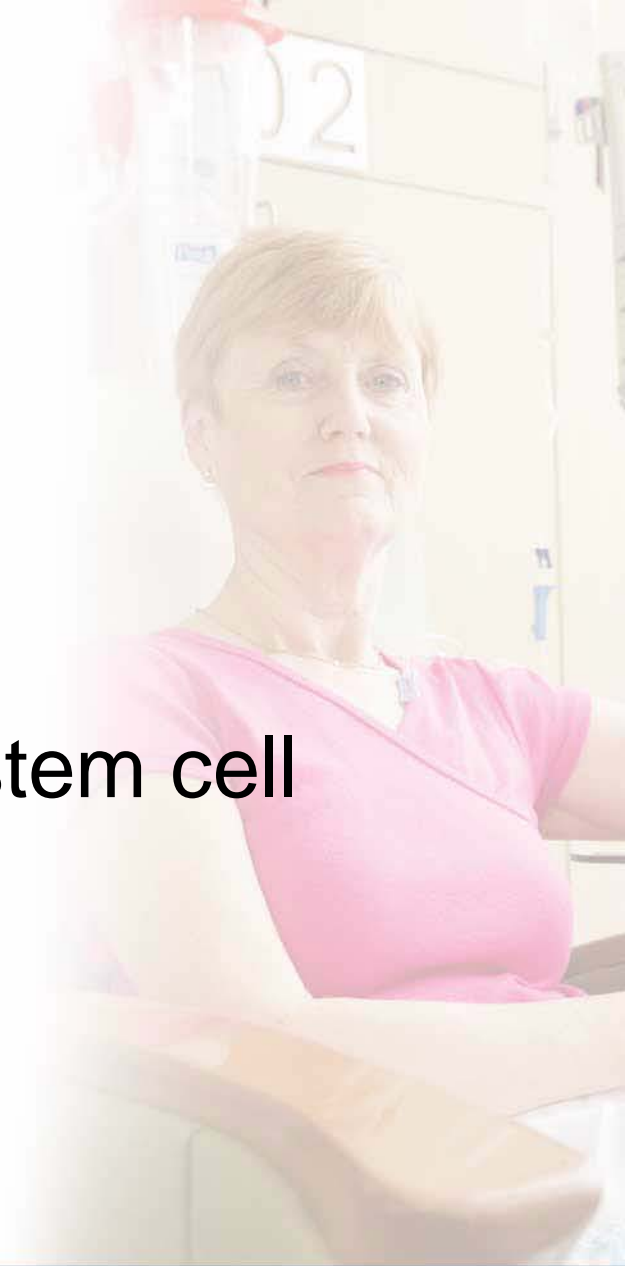
- Possibility of hemolytic reaction due to donor antibodies - rare
 - Stem cell processing may include plasma reduction
- Chance of delayed hemolysis due to “passenger lymphocytes” – 1-2 weeks
 - DAT may become positive due to circulating recipient red cells
- May have life time ABO discrepancy





Patient 2

- 49 year old male
- MDS
- Group B
- Related Group O peripheral stem cell donor

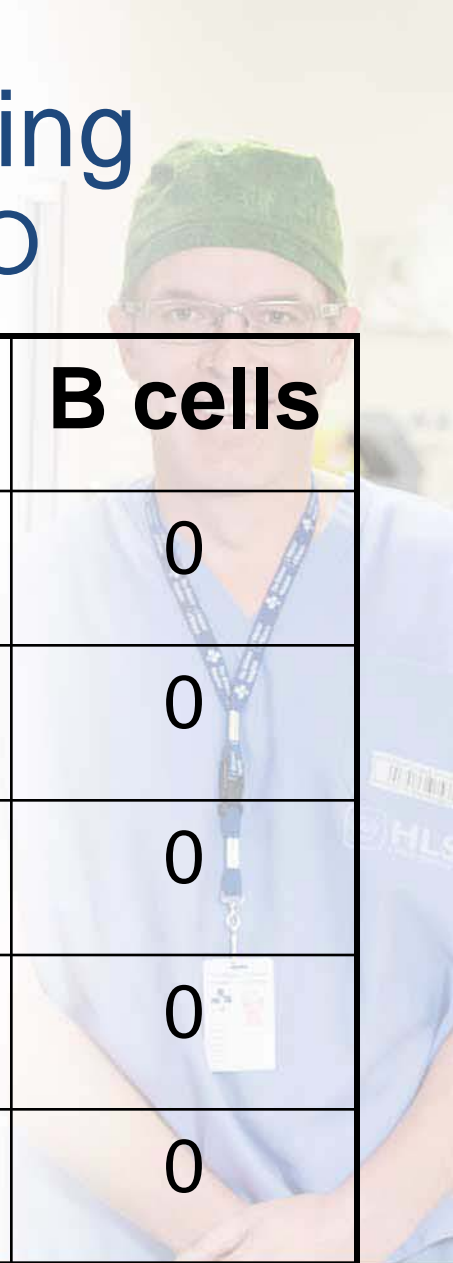




Patient 2: ABO testing

Recipient: B Donor: O

Day	Anti-A	Anti-B	A ₁ cells	B cells
1	0	4MF	3	0
10	0	3MF	3	0
20	0	2MF	3	0
60	0	0	3	0
80	0	0	3	0





Minor ABO-Incompatible Transfusion Support from Transplant to Engraftment

Recipient	Donor	RBCs	Plasma/ Platelets
A	O	O	A, AB
B			B, AB
AB			AB
AB	A	A/O	AB
AB	B	B/O	AB



Major/Minor Incompatible Introduction of novel ABO antigen AND antibody

Group A recipient / group B donor

- Recipient: Anti-B
- Donor: Anti-A

Group B recipient / group A donor

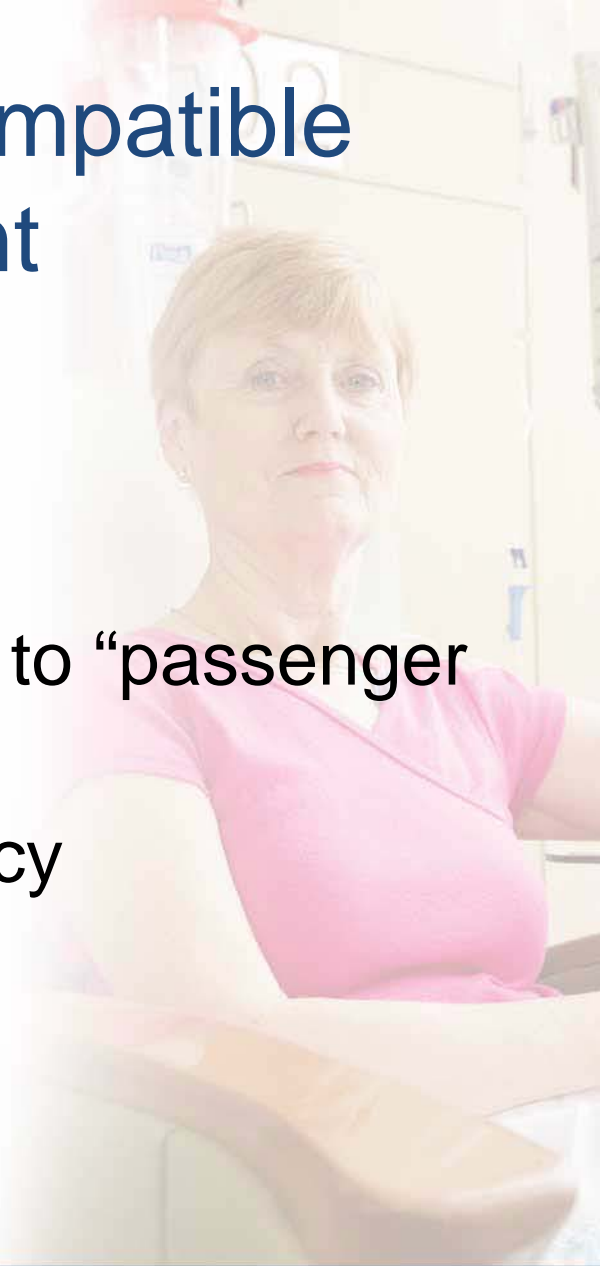
- Recipient: Anti-A
- Donor: Anti-B





Major/Minor Incompatible Transplant

- Bi-directional incompatibility
- Risk of hemolysis during infusion
- Chance of delayed hemolysis due to “passenger lymphocytes” – 1-2 weeks
- May have life time ABO discrepancy



Patient 3

- 31 year old male
- B-cell lymphoma
- Group A
- Unrelated Group B peripheral blood stem cell donor





Patient 3: ABO testing

Recipient: A Donor: B

Day	Anti-A	Anti-B	A ₁ cells	B cells
0	4	0	0	3
5	4	0	0	2
11	4	0	0	0
27	3mf	1mf	0	0
45	1mf	2mf	0	0
90	0	3	0	0



Major/Minor ABO Incompatible Transfusion Support from Transplant to Engraftment

Recipient	Donor	RBCs	Plasma/ Platelets
A	B	O	AB
B	A	O	AB



Updating Recipient ABO in LIS

- Six months post transplant
- Must be RBC transfusion free in past 3 months
- DAT negative
- Forward group has no recipient pre-transplant cells
 - Life time ABO discrepancy: forward and reverse group may never match





Non ABO Incompatibility

- Not well researched
- Not common
 - ABO antibodies are naturally occurring
 - Need prior sensitization
 - More common for recipient with allo-antibody than donor: major incompatibility
- Not as significant?



Patient 4

- 57 year old female
- Acute undifferentiated leukemia
- Group A negative
- ABSC: Positive
 - Anti-D 3+ Gel
 - Anti-E 1+ Gel
- Unrelated group O positive (R_1r) peripheral stem cell donor
 - E neg





Patient 4

Recipient : A neg Donor: O pos

- **One week post:**
 - Anti-D 3+ (gel)
 - Anti-E non reactive (gel)
 - ABO forward: Mixed field with anti-A: receiving group O negative RBC
- **Four weeks post:**
 - Anti-D 2+ (gel)
 - ABO forward: Mixed field with anti-A and anti-D
 - DAT: weak positive
 - Eluate: anti-D
 - Patient making Rh positive red cells!!





Patient 4

Recipient : A neg Donor: O pos

- **6 weeks post:**
 - Anti-D 1-2+ (gel)
 - ABO forward: No reaction with anti-A; mixed field with anti-D
- **16 months post:**
 - Group O pos
 - Anti-D 2+ (solid phase)
 - DAT: 2+
 - Eluate: anti-D
 - Hgb: 120 g/L; normal LD and TBIL





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Patient Notification Card



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Notification of Bone Marrow / Stem Cell Transplantation

Name John Doe		DOB 30.12.1969
Transplant Date 10.12.2008	Pre-transplant Group O Neg	Donor Group (Post-transplant) A Pos

Transfusions:

RBC: O Neg Platelets/Plasma: Group A

RhIG is not recommended.

Switch to Donor Group only after full engraftment.

All cellular blood components must be irradiated.

Transfusion Medicine / Médecine Transfusionnelle 613-737-8302

Carry at all times – Porter sur soi en tout temps



Transfusion Medicine Issues

- Timely notification of transplant patients
- ABORh of recipients and donors
- Selection and inventory of blood products
- Receipt and storage of stem cell products
- Monitoring engraftment and ABO changes
- Notification for transfusion requirements



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Questions?

