

Bespoke platelets

Platelets collected to order

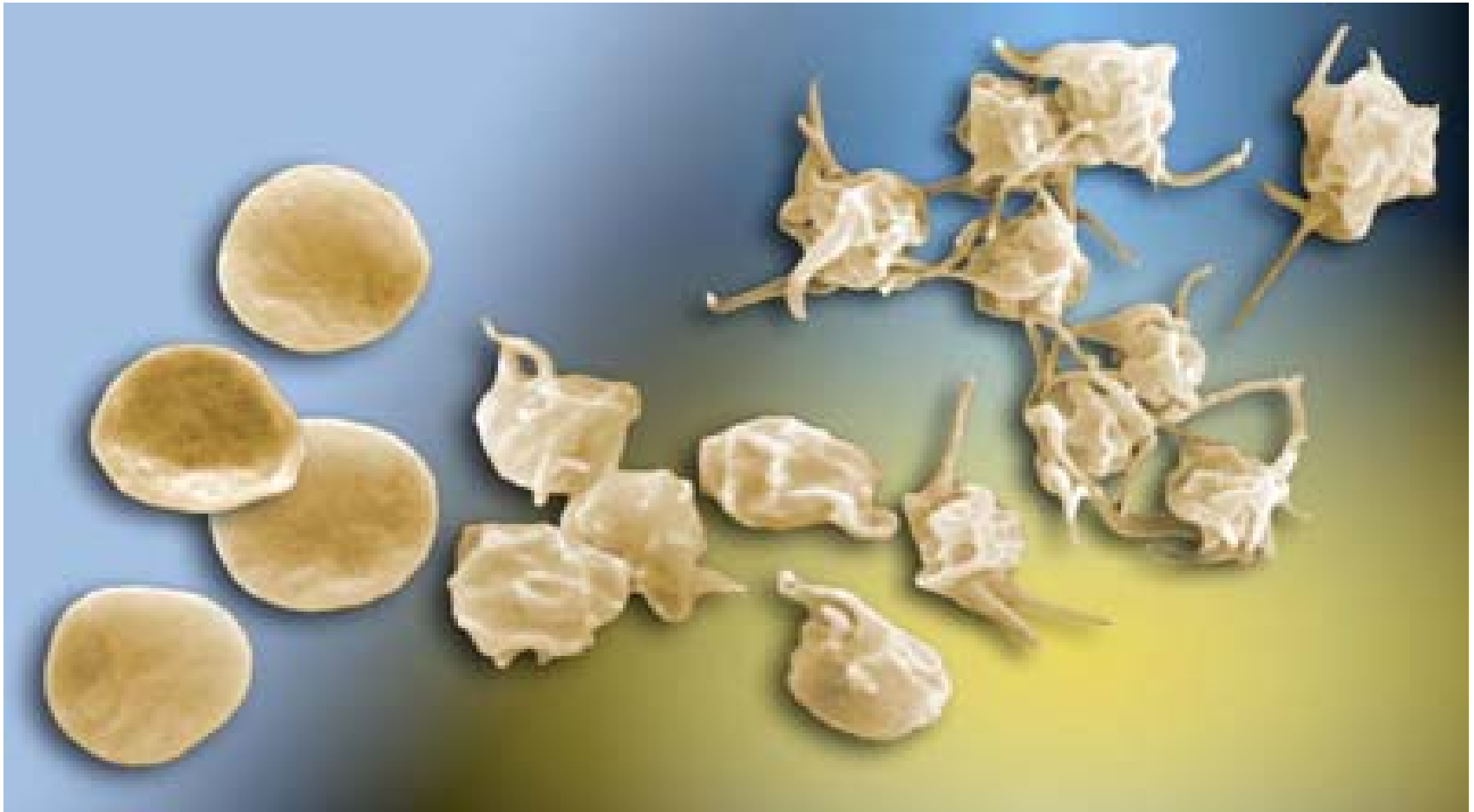
Ann Canty

Transfusion nurse

Bespoke Platelets

- ***Bespoke*** is a British English term employed in a variety of applications to mean an item custom-made to the buyer's specification

Platelets collected to order



Source: *Platelet activation* from University of Pennsylvania School of Medicine

Platelets collected to order

- As expensive and labour intensive as made to order garments
 - HLA
 - HPA
 - IgA deficient
- Require the work of many Blood Service specialists

Source: *Platelet activation* from University of Pennsylvania School of Medicine

Platelets collected to order: Overview

- HLA, HPA and IgA – what are they?
- Who needs HLA-matched platelets?
- What are the processes involved in obtaining them?
- What are the issues?
- Factors influencing demand
- What is the Blood Service doing?
- Future directions

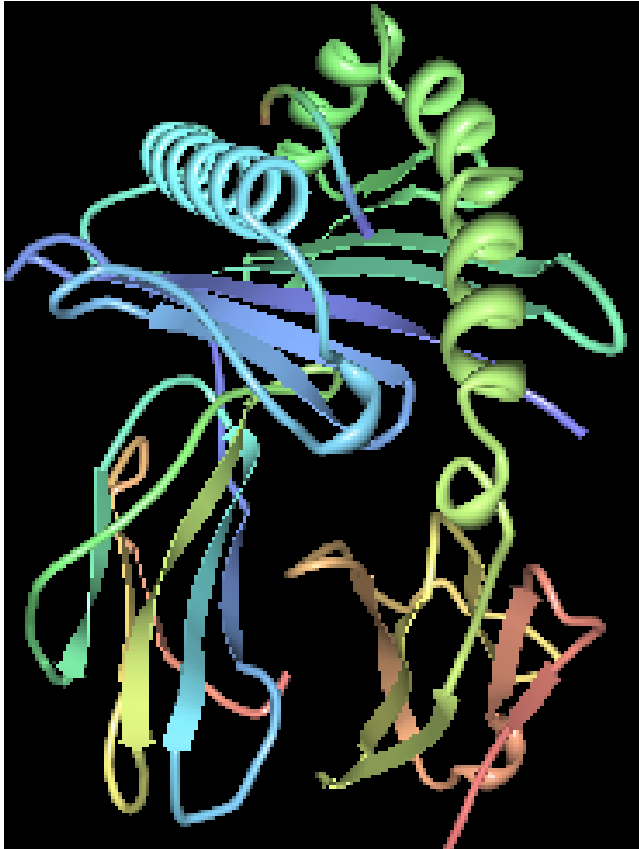
HLA, HPA and IgA – what are they?

- HLA – Human Leucocyte Antigen
 - Major histocompatibility complex
 - Recognition of self and non-self
 - HLA antibody formed through antigen exposure
 - Antibody may be “naturally” occurring¹

Reference

¹ Morales-Buenrostro et al. Transplantation 2008;86(8):1111–1115.

HLA



Source: www.answers.com/topic/hla-b27



Source: biomed.brown.edu/.../Transplantation.html

HLA, HPA and IgA – what are they?

- HPA – Human Platelet Antigen
 - Antibodies 2%–11% of the population
 - Associated with NAIT, 1:3000 births
 - Occasionally seen in setting of haematological malignancy in conjunction with HLA antibody

HLA, HPA and IgA – what are they?

- IgA deficiency
 - Incidence is \approx 1:500 of European descent
 - IgA antibody = allergy, anaphylaxis
 - Require IgA-deficient plasma/platelets
 - Washed red cells

Reference

Sandler SG. Transfusion 2006;46(1):10–13.

Immune response



Source: <http://www.skepticcat.com/2010/02/todays-roundup-february-16-2010.html>

Who needs HLA-matched platelets?

- Refractory to regular platelet transfusions
- Demonstrable HLA antibody
- Intensive chemotherapy regimens
- AML, ALL, NHL, PB SCT, BMT
- Aplastic anaemia
- Myelofibrosis, Myelodysplasia
- Occasional surgical procedure

How to order and why does it take so long?

- Clinical

- Proof of platelet refractoriness

- Take into consideration all potential reasons for poor platelet survival or consumption of platelets
- Sepsis, fever
- Medications
- Splenomegaly
- Disseminated intravascular coagulation
- Veno-occlusive disease

How to order and why does it take so long?

- Proof of platelet refractoriness
 - 2 consecutive poor *Corrected Count Increment's (CCI)* post fresh ABO-compatible platelets
 - Acceptable CCI= >7.5

$$\text{CCI} = \frac{\text{platelet increment (10}^9\text{/l)} \times \text{BSA (m}^2\text{)}}{10^{11} \text{ transfused platelets}}$$

- » CCI = Corrected Count Increment
- » BSA = Body Surface Area

How to order and why does it take so long?

- Clinical
 - Communication with the Blood Service
 - Tissue typing samples
 - HLA antibody screen

Why it takes so long

Tissue Typing Laboratory

- Perform appropriate tests
 - Patient TT
 - HLA antibody screen
 - Identification of antibodies
 - Selection of donors, HLA matched, PRA neg and HLA matchmaker
 - Platelet cross matching

Date	Details of Infused Platelets				Patient's Platelet Count			CCI 10 min ($\times 10^9/l$)		CCI 24 Hour ($\times 10^9/l$)	
	Products	ABO GROUP	Donor/Batch Number	Platelets Infused ($\times 10^{11}$)	Pre Tx 10 min 24 hr	Post Tx 10 minutes	Post Tx 24	<i>Satisfactory Response at 10 minutes:</i>		<i>Satisfactory Response at 24 hours: CCB 4.5</i>	
	Initial Platelet Count										
16-Mar-10	BANK	A POS	9027639	2.4	4	4	2	0.0	Poor Response	-1.6	Poor Response
17-Mar-10	BANK	A POS	9027695	2.4	2	9	2	5.6	Poor Response	0.0	Poor Response
18-Mar-10	HLA	O POS	9041564	2.4	2	34	31	25.7	Satisfactory Response	23.3	Satisfactory Response
19-Mar-10					31						
20-Mar-10					24						
21-Mar-10	HLA	A POS	9051296	2.4	19	52	41	26.5	Satisfactory Response	17.7	Satisfactory Response
22-Mar-10					41						
23-Mar-10					30						
24-Mar-10					22						
25-Mar-10	HLA	A POS	9028655	3.5	12	41	35	16.0	Satisfactory Response	12.7	Satisfactory Response
26-Mar-10					35						
27-Mar-10					19						
28-Mar-10	HLA	A POS	9028655	3.6	14	43	26	15.5	Satisfactory Response	6.4	Satisfactory Response
29-Mar-10					26						
30-Mar-10					19						
31-Mar-10	HLA	A POS	9051578	3	13	44	36	19.9	Satisfactory Response	14.8	Satisfactory Response
1-Apr-10					36						

File Edit View Insert Format Tools Data FlashPaper Window Help Adobe PDF

Type a question for help

100% Arial 10 B I U

Reply with Changes... End Review...

C	D	E	F	G	H	I	J	K	L	Q	R	S	T	AR	AS	AT	AU	AV	AW	AX
Sex	D.O.B	Bld G	Ph	CMV	Coll Date	Coll Site	Sta	a1 loci	a2 loci	b1 loci	b2 loci									
F	15/05/1970	A NEG	W		9/02/2007	5NKDA	5 SA	A1		B8										
F	18/06/1985	A NEG	C	Non-re	20/11/2009	5APLT	5 SA	A1		B8					MATCH					
F	11/10/1957	A NEG	F	Non-re	7/02/2009	5APST	5 SA	A1		B8										
F	17/05/1949	A NEG	*		12/09/2006	5NNUR	5 SA	A1		B8	B14			0 mm						
F	4/03/1945	A NEG	W		14/05/2002	5BGGF	5 SA	A1		B8										
F	22/05/1972	A NEG	C	Non-re	13/08/2002	5APST	5 SA	A1		B8					2 mm					
F	4/03/1959	A NEG	*	Non-re	16/12/2004	5APST	5 SA	A1		B8										
F	31/12/1966	A POS	W	Non-re	23/02/2009	5APEL	5 SA	A1		B8										
M	4/12/1974	A POS	W	Non-re	5/05/2009	5DRAF	5 SA	A1		B8										
F	21/09/1982	A POS	W	Non-re	9/10/2009	5APST	5 SA	A1		B8										
F	2/07/1982	A POS	W	Non-re	24/07/2009	5ANHVM	5 SA	A1		B8										
M	10/06/1961	A POS	*	Non-re	21/06/2002	5APST	5 SA	A1		B8										
F	3/03/1952	A POS	P		31/08/2009	5ANHVP	5 SA	A1		B8										
M	11/09/1956	A POS	D	Non-re	20/11/2009	5APLT	5 SA	A1		B8										
M	19/04/1961	A POS	*	Non-re	4/11/2009	5DRAF	5 SA	A1		B8										
F	16/01/1962	A POS	C	Non-re	22/08/2006	5APLT	5 SA	A1		B8										
M	22/08/1948	A POS	P	Non-re	23/11/2009	5APLS	5 SA	A1		B8										
F	7/03/1970	A POS	W		29/04/2009	5BGAV	5 SA	A1		B8										
M	19/01/1948	A POS	W	Reacti	7/06/2005	5APST	5 SA	A1		B8										
F	2/06/1978	A POS	*		31/01/2006	5ACUR	5 SA	A1		B8	B14									
M	18/09/1953	A POS	W		17/07/2009	5ANHVM	5 SA	A1		B8										
F	19/12/1967	A POS	W	Non-re	14/05/2008	5APEL	5 SA	A1		B8										
F	4/12/1964	A POS	S		6/04/2004	5ANHVM	5 SA	A1		B8										
F	19/01/1948	A POS	S	Reacti	29/09/2007	5APST	5 SA	A1		B8										

Sheet1 HLA (national)-Aug09/

start

2:04 P

File Edit View Insert Format Tools Data FlashPaper Window Help Adobe PDF Type a question for help

100% Arial 10 B I U

Reply with Changes... End Review...

M25

A	B	C	D	E	F	G	H	I	J	K	L
	Products	Time of Issue	Donor/Batch Number	Platelets Infused (x 10 ¹¹)	Pre Tx (Previous 24 hr count)	Post Tx 10 minutes	Post Tx 24	10 min (x10 ⁹ /l)		24 Hour (x10 ⁹ /l)	
	Initial Platelet Count							Satisfactory Response at 10 minutes:		Satisfactory Response at 24 hours:	
11-Apr-08	BANK		9756241	2.4	3		8			4.5	Poor Response
12-Apr-08	BANK x 2		1550175/9754515	4.8	8	14	2	2.7	Poor Response	-2.7	Poor Response
13-Apr-08	BANK x 2		9754351/9756482	4.8	2	12	2	4.5	Poor Response	0.0	Poor Response
14-Apr-08	BANK x 2		9754515/1550207	4.8	2	7	3	2.2	Poor Response	0.4	Poor Response
15-Apr-08	BANK x 2		9754641/9754571	4.8	3	12	5	4.0	Poor Response	0.9	Poor Response
16-Apr-08	BANK x 2		1550233/9754739	4.8	5	19	8	6.3	Poor Response	1.3	Poor Response
17-Apr-08	BANK		9756764	2.4	8						
18-Apr-08	BANK		9754806	2.4	4	8	6	3.6	Poor Response	1.8	Poor Response
19-Apr-08					6						
20-Apr-08	BANK		9754941	2.4	6	16	19	9.0	Satisfactory Response	11.6	Satisfactory Response
21-Apr-08	BANK		9754941	2.4	19	34	42	13.4	Satisfactory Response	20.6	Satisfactory Response
23-May-08					8						
24-May-08	HLA		9765732	3.7	8	18		5.8	Poor Response		
19-Jun-08											
20-Jun-08	HLA x 2		4486070/5138938	4.8	4	28		10.8	Satisfactory Response		
21-Jun-08											
22-Jun-08	HLA x 2		9778641/2542566	4.8	5	17	11	5.4	Poor Response	2.7	Poor Response
23-Jun-08	HLA		6105704	2.4	11	19	11	7.2	Poor Response	0.0	Poor Response
24-Jun-08					11						
25-Jun-08	HLA		9776994	3.3	5	16	6	7.2	Poor Response	0.7	Poor Response
26-Jun-08	BANK		5139608	2.4	6	15	10	8.1	Satisfactory Response	3.6	Poor Response
27-Jun-08					10						
28-Jun-08	HLA		6105889	2.4	6	14	10	7.2	Poor Response	3.6	Poor Response
29-Jun-08	HLA		9789952	2.4	10	10	10	7.2	Poor Response	3.6	Poor Response

g Increments080701.xls: [Progress Bar]

start [Taskbar Icons] 2:45 P Monday

Donor List

Sex	DOB	ABO	CMV	L/Phle	Date	L/Coll	.	a1 loci	a2 loci	b1 loci	b2 loci
M	23/10/1959	A POS	Reactive	D	7/11/2007	4ABHA	QLD	A29		B44	B45
M	26/09/1956	AB NEG	Reactive	W	17/08/2007	4DDET	QLD	A29		B44	
F	12/05/1953	A POS		W	3/04/2001	5NYOR	SA	A29		B44	B49
F	16/10/1972	A POS		W	14/10/2003	5NLOX	SA	A29		B44	
F	6/06/1954	A POS	Reactive	S	11/12/2003	5APST	SA	A29		B44	
F	28/02/1951	A POS	Non-reactiv	S	1/02/2005	5ANHW	SA	A29		B44	
M	24/12/1945	AB POS	Non-reactiv	C	7/11/2007	6APET	WA	A29		B44	
F	29/03/1961	B POS	Non-reactiv	S	26/11/2007	6APET	WA	A29		B44	
M	10/09/1971	A NEG	Non-reactiv	P	25/05/2006	6AWHT	WA	A11		B44	
F	24/02/1963	AB POS		W	13/10/1999	4DDCH	QLD	A11	A29	B44	
F	6/05/1962	A NEG	Non-reactiv	W	20/09/2007	5APST	SA	A11	A29	B44	
M	29/02/1960	A POS	Non-reactiv	W	21/02/2008	5BPAD	SA	A11	A29	B44	
F	15/05/1968	O POS	Reactive	W	12/10/2007	5ACUR	SA	A11	A29	B44	
F	15/09/1951	A POS	Non-reactiv	P	23/12/2003	6APET	WA	A11	A29	B44	
F	8/11/1974	AB POS	Reactive	P	3/04/2002	6AWHT	WA	A29		B40	B44
F	28/12/1970	AB POS		W	17/03/2003	5BPAD	SA	A29		B44	B56
M	1/02/1980	O POS	Non-reactiv	W	28/08/2007	5ACUR	SA	A29		B44	B62
M	24/02/1968	O POS	Reactive	C	3/04/2008	4ABHA	QLD	A29	A32	B44	B45
F	27/09/1969	A POS	Reactive	W	4/02/2008	5APEL	SA	A29	A32	B44	
M	28/09/1961	B POS		F	7/01/2004	5BEZT	SA	A29	A32	B44	
F	9/04/1962	O POS	Reactive	W	30/08/2007	5APEL	SA	A29	A32	B44	
F	15/06/1971	O POS	Non-reactiv	C	23/03/2001	5APST	SA	A29	A32	B44	
F	31/12/1959	O POS	Non-reactiv	S	31/01/2008	5APEL	SA	A29	A32	B44	
F	26/05/1945	A POS		F	24/05/2006	5BPAD	SA	A29	A33	B44	
F	19/09/1949	B POS		W	3/10/2007	5ACUR	SA	A29	A33	B44	
M	19/01/1955	O NEG	Reactive	*	28/02/2008	5BGAW	SA	A32		B44	
M	8/11/1961	O POS	Reactive	P	31/03/2008	6APET	WA	A32		B44	B44

Match
2 m/m
3 m/m
4 M/M
5 M/M
6 M/M
7 M/Match

“An important part of the support of the refractory patient is to readjust expectations toward what constitutes acceptable clinical hemostasis rather than a desired PLT count”

Sunny Dzik

Reference

Sunny Dzik, Transfusion 47(3) 2007, 374-8

How to order and why does it take so long?

- Blood Service
 - Selection of appropriate platelet donors
 - Scheduling of donor appointments
 - Mandatory testing
 - Bacterial contamination screening
 - Issue to requesting hospital

The issues

- Lack of typed platelet donors
 - Only 3% of the population are blood donors
 - 10-15% of blood donors are apheresis donors
 - Fewer of these have been tissue typed
 - Imagine the “low frequency” antigen representation

The issues

- Ethnic minorities not represented
- How many donors is enough?
- Donor panel in a state of flux
 - Mobility
 - Health
 - Fashion (tattooing)
 - Time constraints

Blood Service – Duty of care

- Donor protection
 - Donation interval
 - Blood counts, platelet count
 - General health
 - Medications
 - Surgery
 - Age
 - Weight
 - Venous access



Source: <http://theinspirationroom.com/daily/commercials/2007/10/pure-blonde-scenery.jpg>

Recipient protection

- Product integrity
 - Donor suitability
 - Mandatory screening
 - Bacterial contamination
 - Group O – haemolysin testing
 - Leucodepleted, irradiated

Factors effecting requests

- Leucodepleted products since 2008
- Antibodies are still present in many recipients
- More patients receiving intensive chemotherapy regimens
- More solid organ and stem cell transplants
- Cord blood transplants

Increase in haematological malignancy

- It is projected that in 2010:
 - 4,734 Australians will be diagnosed with lymphomas
 - 3,138 with leukaemias
 - 2,191 with myeloma
 - more than 10,000 people in total.
 - MDS \approx 988
 - Aplastic Anaemia

Reference

www.leukaemia.org.au (Australian Institute for Health & Welfare)

What is the Blood Service doing?

- Recognition of the ongoing need for service
- National approach
- Already dedicated staff to liaise with hospitals, manage requests
- Need for more typed donors
- Maintenance of platelet donor panels

Future directions

- Empirical data on platelet transfusion triggers, TOPPS trial, platelet dose
- Extend platelet shelf life
- Cryopreservation

Reference

Neuhaus SJ, Wishaw K, C Lelkens. MJA 2010;192(4):203–205.

Bespoke Platelets

- Made from the rarest materials
- Uniquely tailored to the client's requirements
- Labour intensive
- Undergo rigorous testing
- Take time to acquire
- Are not available “off the rack”

Acknowledgements

- Blood Service – TMS Nurses & Medical officers
- Tissue typing Scientists
- W.A. Red cell serology Scientists
- Ken Davis & SA pathology team
- TMS SA team
- **Our Donors**

Bespoke platelets

Platelets collected to order

Ann Canty

Transfusion nurse