

Auto Immune Hemolytic Anemia: out of order



Name: Melanie Tokessy
ORBCON Spring Symposium
April 14, 2021



Disclosures

- I have no relevant conflicts of interest





Objectives

- Learn how AIHA samples are processed in the lab
- Discuss crossmatching procedures for AIHA patients



AIHA Case

- 51M, previously healthy
- Presented with weakness and dark orange urine, rigors and chills, exertional dyspnea
- Hb 64-> 54 WBC 9.8 PLT 202
- Retics 4.1
- Haptoglobin <0.1
- LDH 964
- Bili 111/8
- DAT positive IgG, negative C3



Worse case scenario:

- T&S arrives Saturday @02:00
- 2 RBC ordered
- ABORh: A positive
- ABSC: All cells positive 3+

PANOSCREEN Master List

IMMUCOR, INC. Norcross, GA 30071 USA
US LICENSE NO: 886

LOT NO: 08431
EXPIRES: 2021/04/30

Donor	Rh - Hr				Kell				Duffy		Kidd		Lewis		P		MN		Luth-eran		Xg	A	H	G							
	D	C	c	E	e	C-	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	P ₁	M	N	S	s	Lu ^a	Lu ^b	Xg ^a					
I 198431	+	+	0	0	+	0	+	+	0	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	+	+	+	3			
II 298431	+	0	+	+	0	0	+	+	0	+	0	+	+	+	0	+	0	+	+	0	+	+	+	0	+	+	+	3			
III 398431	0	0	+	+	0	0	0	+	0	+	0	+	+	0	0	+	+	+	+	0	+	0	+	+	+	+	3				

* Indicates those antigens whose presence or absence may have been determined using only a single example of a specific antibody. An antigen designated with a "w" represents a weakened expression of the antigen that may or may not react with all examples of the corresponding antibody.

51M AIHA

DIFFERENTIAL DIRECT ANTIGLOBULIN TEST:

POLY	POLY 5	6% ALB	-IgG	-C3	-C3 5m	Tech

	-A	-B	-D	A1	B	ABO
	3	0	3	0	3	APDS

INTERPRETATION: _____

Date tested: _____
 Set up by: _____
 Read by: _____



Transfusion Medicine workup:

- Set up RBC panel and include an auto control
 - All cells positive 3+
 - Auto control positive 3+
 - DAT: IgG positive 3+

A
PANOCELL -16
 Master List
 IMMUCOR, INC. Norcross, GA 30071 USA
 US LICENSE NO: 886
 LOT NO: 10658
 EXPIRES: 2021/05/14

NAME 51M AIHA
 NO. _____
 INSTITUTION _____
 BLOOD GROUP _____
 ANTIBODY IDENTITY _____
 TECH _____ DATE _____

CELL	Special Type	Donor	Rh - Hr		Kell								Duffy		Kidd		Lewis		P		MN		Lutheran		Xg	PATIENT'S TEST RESULTS						
			D	C	c	E	e	C*	K	Kp*	Kp*	Js*	Js*	Fy*	Fy*	Jk*	Jk*	Le*	Le*	P*	M	N	S	s	Lr*	Lr*	Xg*	A	B	C	G	
1		RzR1w A3566	+	+	0	+	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	1	3				
2		R1wR1 B10397	+	+	0	0	+	+	0	+	+	0	+	+	0	0	0	+	+	0	0	+	+	0	+	+	2	3				
3		R2R2 C4460	+	0	+	+	0	0	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	3	3				
4	He+	Ror D563	+	0	+	0	+	0	0	+	+	0	+	+	0	0	0	+	+	0	+	+	0	+	+	0	4	3				
[6]		r'r E1117	0	+	0	+	0	0	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	0	5	3				
[6]		r'r F1001	0	0	+	+	0	0	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	6	3				
[7]		rr G1704	0	0	+	0	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	+	7	3				
8		rr H1288	0	0	+	0	+	0	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	0	8	3				
9		R1R1 B9895	+	+	0	0	+	0	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	9	3				
10		R1R1 B9075	+	+	0	0	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	+	10	3				
11		R1R2 A4963	+	+	+	+	0	0	0	+	+	0	+	+	0	0	+	+	0	+	+	0	+	0	+	0	11	3				
12		rr N4058	0	0	+	0	+	0	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	12	3				
13		rr G1497	0	0	+	0	+	0	+	+	0	+	+	0	0	0	+	+	0	+	+	0	+	+	+	+	13	3				
14		rr H1409	0	0	+	0	+	0	0	+	+	0	+	+	0	0	+	+	0	0	+	+	0	+	+	+	14	3				
15		rr N1713	0	0	+	0	+	0	0	+	+	0	+	+	0	0	+	+	0	0	+	+	0	+	+	+	15	3				
16	V+, VS+	rr V160	0	0	+	0	+	0	0	+	+	0	0	0	+	+	0	W	+	0	0	+	+	0	+	+	16	3				
PC		PATIENT'S CELLS																														
DIRECT ANTIGLOBULIN TEST			ELUATE RESULT			* Indicates those antigens whose presence or absence may have been determined using only a single example of a specific antibody. An antigen designated with a 'w' represents a weakened expression of the antigen that may not react with all examples of the corresponding antibody.																										
POLY			IgG			C3			In those instances where a patient's serum is known to contain anti-D, it may be desirable to perform antibody screening tests with D- red cells. The panel cells whose vital numbers are set off by brackets ([]) can be used to form a three- or four-val D-negative antibody screening reagent. All bracketed cells must be used to construct a complete screening reagent.																							
LOT			RESULT			PATIENT'S SERUM: REVERSE GROUPING CELLS																										
						I II III A1 A2 B																										



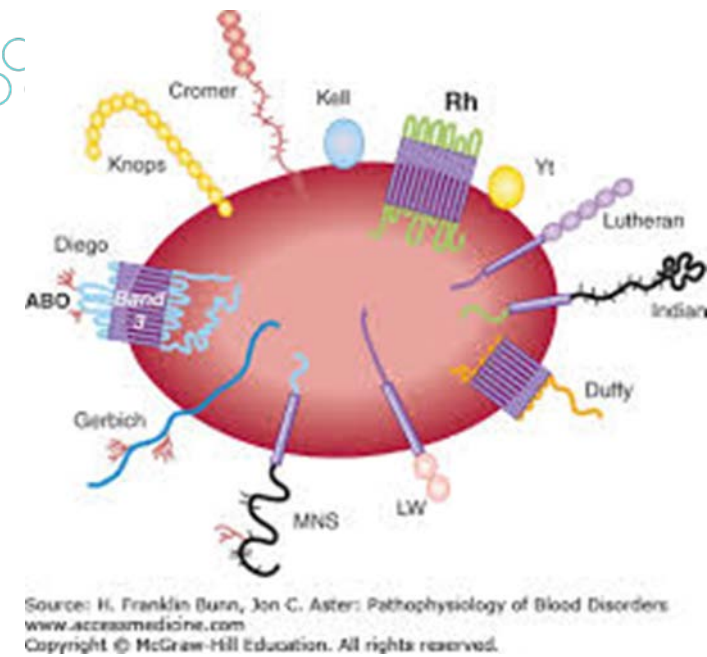
Transfusion Medicine workup:

- Auto control positive but only autoantibody?
- Must remove the interference of the autoantibody to determine if patient has an alloantibody
- Page TM physician on call
- Patient history: transfusion, pregnancy, med list



What to crossmatch?

- O neg RBC not the universal donor in this case
- Crossmatch ABORh matched only?
 - All crossmatch results will be incompatible
 - Is there an alloantibody?



Blood needed urgently:

- Phenotype patient for common antigens:
 - CcEe K Jka Jkb Fya Fyb S s
- Crossmatch RBC that are phenotype similar:
 - Avoid alloantibody
 - Difficult match?
 - Order in from CBS
 - Drop some antigens
 - RBC crossmatch will still be incompatible

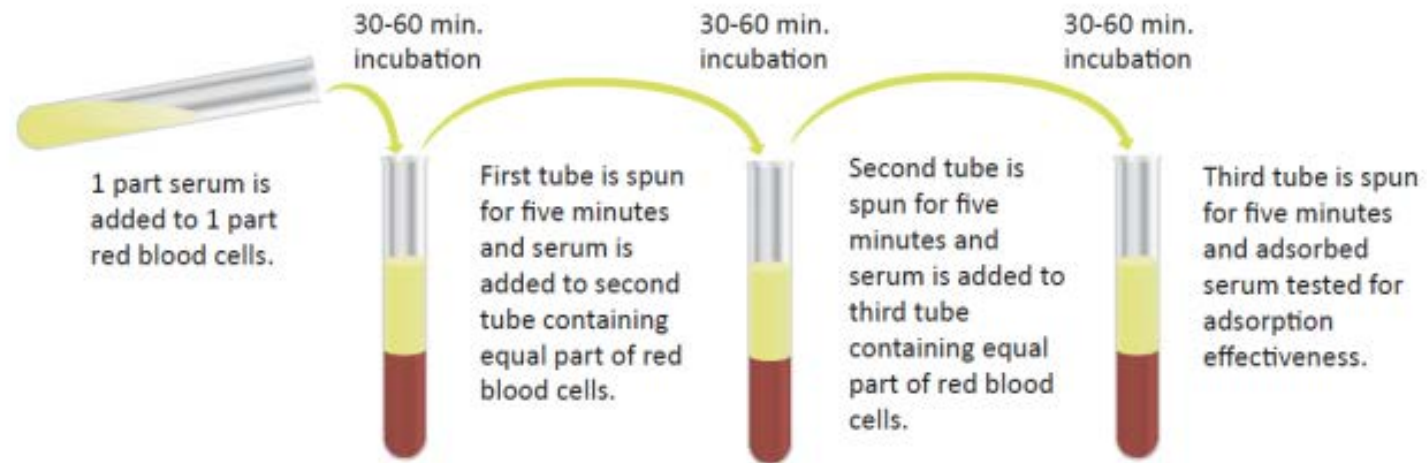


Adsorption of autoantibodies:

- Use RBC to remove an antibody from patient's plasma
- Useful in exposing alloantibodies from autoantibodies



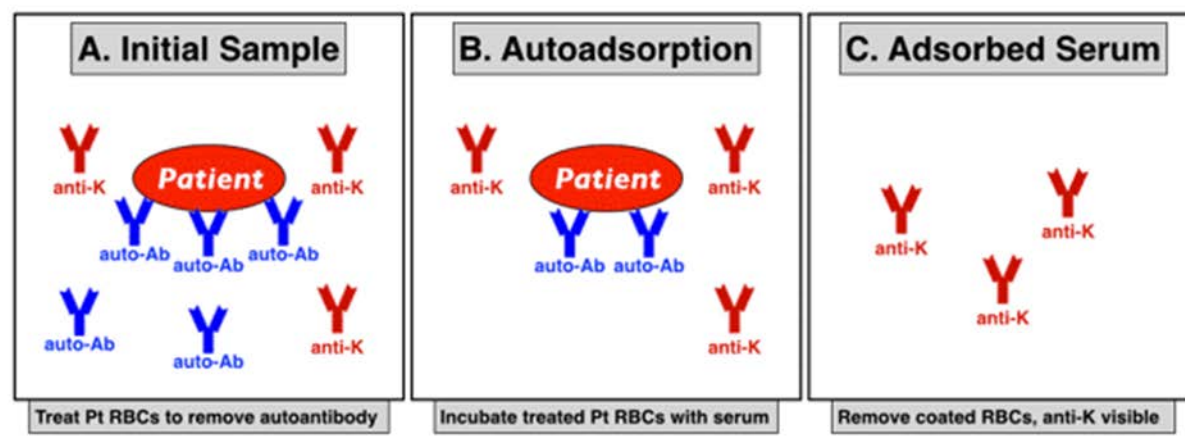
Adsorption takes time!



Time per procedure = 105-195 min.

Autoadsorption:

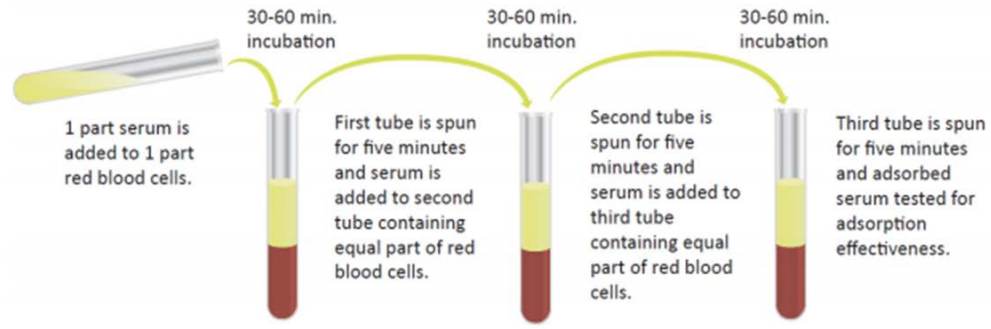
- Patient must not have been transfused in last 3 months
- Safest type of adsorption
- Uses patient's own RBC as a 'magnet'



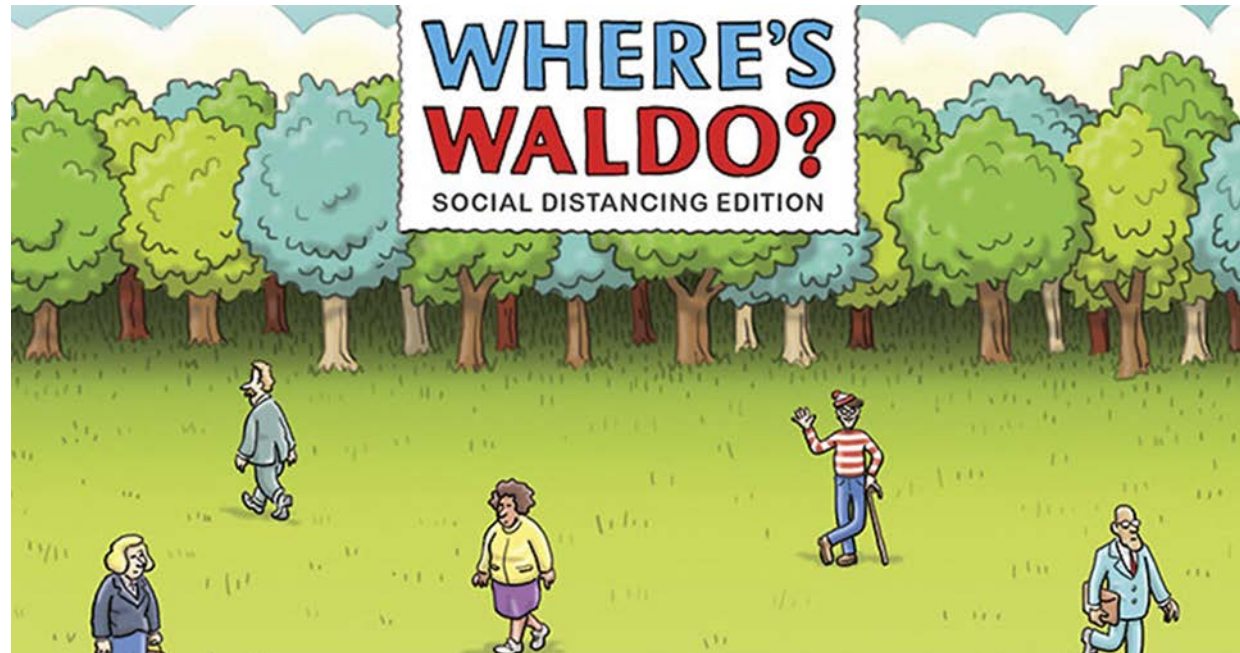
Autoadsorption

- Patient RBC are already coated with the autoantibody
- Must dissociate the autoantibody off the patient's RBC to allow for better adsorption
- Treat patient RBC with ZZAP (papain, DTT) then perform adsorption
- Use adsorbed plasma for antibody screen/investigation





Time per procedure = 105-195 min.



A
PANOCELL -16

Master List

IMMUCOR, INC. Norcross, GA 30071 USA

US LICENSE NO: 886
LOT NO: 10658
EXPIRES: 2021/05/14

NAME 51M AIHA
NO. _____
INSTITUTION _____
BLOOD GROUP _____
ANTIBODY IDENTITY _____
TECH _____ DATE _____

CELL	Special Type	Donor	Rh - Hr		Kell								Duffy		Kidd		Lewis		P	MN				Lutheran		Xg	PATIENT'S TEST RESULTS											
			D	C	c	E	e	C ^w	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	P ₁	M	N	S	s	Lu ^a	Lu ^b	Xg ^a	CELL	A	B	A/A	B/B					
1		RzR1w A3566	+	+	0	+	+	+	0	+	0	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	0	+	+	+	+	1	3	0			
2		R1wR1 B10397	+	+	0	0	+	+	0	+	0	+	0	+	+	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0		
3		R2R2 C4480	+	0	+	+	0	0	0	+	+	+	0	+	0	0	+	+	0	+	+	0	0	0	0	0	0	0	0	0	0	0	0	3	3	0		
4	Het	Ror D563	+	0	+	0	+	0	0	+	0	+	+	+	0	0	+	0	0	0	+	0	+	+	+	0	+	0	+	0	+	0	4	3	0			
[5]		r'r E1117	0	+	+	0	+	0	0	+	0	+	0	+	+	0	+	0	+	+	+	+	+	+	0	+	0	+	0	+	0	5	3	0				
[6]		r'r F1001	0	0	+	+	+	0	0	+	0	+	0	+	+	+	0	+	0	+	+	+	+	+	+	0	+	0	+	0	6	3	0					
[7]		rr G1704	0	0	+	0	+	0	+	+	0	+	0	+	+	0	+	0	+	+	+	+	+	+	0	+	0	+	0	+	0	7	3	2				
8		rr H1268	0	0	+	0	+	0	0	+	0	+	0	+	+	0	+	0	+	0	0	0	0	0	0	0	0	0	0	0	0	8	3	0				
9		R1R1 B9895	+	+	0	0	+	0	0	+	0	+	0	+	+	0	0	+	+	+	+	+	+	0	0	+	+	+	+	+	+	9	3	0				
10		R1R1 B9075	+	+	0	0	+	0	+	+	0	+	0	+	0	+	0	+	+	+	+	+	+	0	0	+	0	+	+	+	+	10	3	2				
11		R1R2 A4963	+	+	+	+	+	0	0	+	0	+	0	+	+	0	0	+	+	0	+	+	0	0	0	0	0	0	0	0	0	11	3	0				
12		rr N4058	0	0	+	0	+	0	0	+	0	+	0	+	+	0	+	0	+	0	+	0	0	0	0	0	0	0	0	0	0	12	3	0				
13		rr G1497	0	0	+	0	+	0	+	+	0	+	0	+	+	0	0	+	0	0	+	0	0	0	0	0	0	0	0	0	0	13	3	2				
14		rr H1409	0	0	+	0	+	0	0	+	0	+	0	+	+	0	0	+	0	+	0	0	0	0	0	0	0	0	0	0	0	14	3	0				
15		rr N1713	0	0	+	0	+	0	0	+	0	+	0	+	+	0	0	+	0	0	+	0	0	0	0	0	0	0	0	0	0	15	3	0				
16	V+, VS+	rr V160	0	0	+	0	+	0	0	+	0	+	0	0	0	0	+	+	0	W	+	0	0	0	0	0	0	0	0	0	16	3	0					
PC		PATIENT'S CELLS																																PC	3	0		

* Indicates those antigens whose presence or absence may have been determined using only a single example of a specific antibody. An antigen designated with a 'w' represents a weakened expression of the antigen that may not react with all examples of the corresponding antibody.

In those instances where a patient's serum is known to contain anti-D, it may be desirable to perform antibody screening tests with D- red cells. The panel cells whose vial numbers are set off by brackets [] can be used together to form a three- or four- vial D-negative antibody screening reagent. All bracketed cells must be used to construct a complete screening reagent.

416-18

Anti-K

PATIENT'S SERUM: REVERSE GROUPING CELLS	PANO- SCREEN LOT	I				
		II				
		III				
		A1				
	A2					
	B					



Alloadsorption:

- To be performed when no pre-transfusion RBC available
- Risk: may adsorb clinically significant alloantibodies
- Pretransfusion phenotypes?
 - Select RBC that are phenotype identical
- Differential adsorption
 - Complex
 - Time consuming





Differential Alloadsorption:

- Use multiple homologous RBC with known antigens
- ZZAP treat the RBC:
 - DTT: destroys Kell system
 - Papain: removes Fya, Fyb, M, N, S and s
- Select R1R1, R2R2 and rr, ensure one of the three is Jka- and one is Jkb-



Adsorbing RBC Phenotype	Potential Antibodies Removed	Potential Antibodies Remaining in Plasma <i>(in addition to Kell, Duffy, MNS antibodies)</i>
<i>Rh Antigens</i>		
R1R1 (DCe/DCe)	Anti-D, anti-C, anti-e Autoantibody	Anti-c, anti-E
R2R2 (DcE/DcE)	Anti-D, anti-c, anti-E Autoantibody	Anti-C, anti-e
rr (dce/dce)	Anti-c, anti-e Autoantibody	Anti-D, anti-C, anti-E
<i>Kidd Antigens</i>		
Jka/Jka	Anti-Jka Autoantibody	Anti-Jkb
Jkb/Jkb	Anti-Jkb Autoantibody	Anti-Jka



Cautionary tale:

- Patient transfused every 2 weeks
- This week all panel cells positive and auto
- DAT positive, eluate positive
- Differential alloadsorption performed
- Patient transfused with 2 RBC units crossmatched compatible with adsorbed plasma
- Patient is home with fever and lower flank pain



PANOCELL -16

Master List

IMMUCOR, INC. Norcross, GA 30071 USA

US LICENSE NO: 886
 LOT NO: 06625
 EXPIRES: 2021/04/16

NAME Lutheran
 NO. _____
 INSTITUTION _____
 BLOOD GROUP _____
 ANTIBODY IDENTITY _____
 TECH _____ DATE _____

CELL	Special Type	Donor	Rh - Hr			Kell								Duffy		Kidd		Lewis		P		MN				Lutheran			Xg	PATIENT'S TEST RESULTS					
			D	C	c	E	e	Cw	K	k	Kp ^a	Kp ^b	Js ^a	Js ^b	Fy ^a	Fy ^b	Jk ^a	Jk ^b	Le ^a	Le ^b	P ₁	M	N	S	s	Lu ^a	Lu ^b	Xg ^a	CELL	A	H	G			
1	M(a+), GP.Mur	R1R1 B9060	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	+	+	+	0	0	+	0	+	+	+	+	1	2				
2		R1wR1 B6958	+	+	0	0	+	+	+	+	0	+	0	+	+	+	+	0	+	0	+	+	+	+	0	+	+	+	2	2					
3		R2R2 C4463	+	0	+	+	0	0	0	+	0	+	0	+	0	+	+	+	0	+	0	+	+	+	0	+	+	+	3	2					
4	Gc(a+)	Ror D450	+	0	+	0	+	0	0	+	0	+	+	0	0	+	+	0	+	+	0	+	0	+	0	+	0	+	4	2					
[5]	Cc(b+)	r'r E431	0	+	+	0	+	0	0	+	0	+	0	+	0	+	+	0	+	+	+	+	+	+	0	+	0	+	5	2					
[6]		r'r F763	0	0	+	+	+	0	0	+	0	+	0	+	+	+	0	+	0	+	+	+	+	0	+	0	+	+	6	2					
[7]		rr G1938	0	0	+	0	+	0	+	0	+	0	+	0	+	+	+	0	+	+	+	+	+	0	+	+	+	+	7	2					
8		rr H2002	0	0	+	0	+	0	0	+	0	+	0	+	0	+	0	0	0	+	+	0	+	0	+	0	+	+	8	2					
9		R1R1 B9275	+	+	0	0	+	0	+	0	+	0	+	+	0	+	0	0	0	+	+	0	+	0	+	0	+	+	9	2					
10		R1R1 B2851	+	+	0	0	+	0	0	+	0	+	0	+	+	W	+	+	0	+	0	0	+	0	+	0	+	+	10	2					
11	D(a+)	RzR2 A3585	+	W	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	0	0	+	0	+	+	+	11	2					
12		rr N4325	0	0	+	0	+	0	0	+	0	+	0	+	+	+	+	0	+	0	+	0	+	0	+	0	+	0	12	2					
13		rr G1614	0	0	+	0	+	0	+	0	+	0	+	+	+	0	+	+	0	+	+	+	0	+	+	0	+	+	13	0					
14		rr H1592	0	0	+	0	+	0	0	+	+	+	0	+	+	0	0	+	0	+	+	+	+	+	0	+	+	+	14	2					
15	Bg(a+y)	rr N4688	0	0	+	0	+	0	0	+	0	+	0	+	+	+	+	0	+	0	+	0	+	0	+	0	+	+	15	2					
16		rr N4855	0	0	+	0	+	0	0	+	0	+	0	+	+	+	+	0	0	+	+	+	0	+	0	+	0	+	16	2					
PC		PATIENT'S CELLS																											PC	1					

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In those instances where a patient's serum is known to contain anti-D, it may be desirable to perform antibody screening tests with D- red cells. The panel cells whose vial numbers are set off by brackets (0) can be used together to form a three- or four-vial D-negative antibody screening reagent. All bracketed cells must be used to construct a complete screening reagent.

PATIENT'S SERUM: REVERSE GROUPING CELLS	PANO- SCREEN LOT	I	
		II	
		III	
		A1	
	A2		
	B		

416-18

Crossmatching:

- Use neat and/or adsorbed plasma
 - Neat crossmatch would be “incompatible”
 - Adsorbed plasma would be compatible
- Crossmatch phenotype similar regardless



Warm autoantibody with specificity:

- Most WAA show panagglutination
- If showing specificity usually in Rh system
- Often auto anti-e like
- What to transfuse?
 - May expose the patient to 'double dose' antigen absent from their own cell
 - If active hemolysis is ongoing, blood lacking that antigen should be selected

aabb 20th Ed Tech Manual





IQMH VI.I: TM122

When clinically significant red cell antibodies are found, or the recipient's history contains a record of such antibodies, donor units lacking the corresponding antigen should be selected for transfusion and shall be demonstrated to be compatible by a crossmatch method designed to detect such antibodies. Any exceptions shall be approved by the medical director or his or her designate.

When the clinical situation justifies an exception, the risk of using incompatible blood must be communicated to the physician, who must accept and sign for acceptance. [1219]





Conclusion:

- Working up patients for autoantibodies is time consuming and usually will delay transfusion
- Large hematology centers process many patients with autoantibodies throughout the week
- Need informed technical staff and the support of TM physicians and good operating procedures/policies



