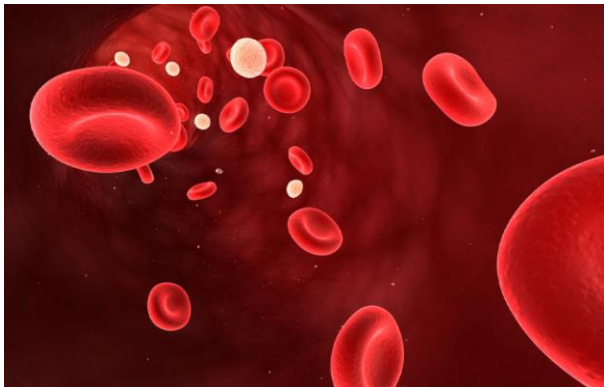


Multi-Layered Case Study

Martin Maley

University of Sunderland



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Patient Details

- 57 year old female
- 'MDS'
- 'Screen pos - ? Antibodies'
- Transfused 2 units RBCs 35 days ago
- 2 crossmatched units requested

RCl Initial Findings

- Group O D+
- Rh Phenotype ccDEE (C-, e-)
- Most probable R2R2
- K-

Bio-Rad Gel Antibody ID Panel

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk		Results			
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b	IAT	Enz/IAT		
1	R ₁ ^w R ₁	+	+	0	0	+	+	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0	3	5		
2	R ₁ R ₁	+	+	0	0	+	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+	3	5		
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+	1	4		
4	r'r	0	+	0	+	+	0	0	+	+	0	0	+	+	0	+	0	+	0	0	0	0	+	3	5		
5	r''r	0	0	+	+	+	0	0	+	+	+	3	0	+	0	+	0	0	+	+	0	+	0	3	5		
6	rr	0	0	0	+	+	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+	3	5		
7	rr	0	0	0	+	+	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0	3	5		
8	rr	0	0	0	+	+	0	+	+	0	+	0	0	+	0	+	+	+	0	+	0	0	+	3	5		
9	rr	0	0	0	+	+	0	+	0	+	+	1	0	+	0	+	+	0	+	+	0	+	0	3	5		
10	rr	0	0	0	+	+	0	+	0	+	0	4	0	+	+	+	0	0	+	0	+	0	+	3	5		
Auto																								1			



What is causing these reactions?

Single alloantibody

0%

Multiple alloantibodies

0%

Specific autoantibody

0%

Non-specific autoantibody

0%

Cell	Rh	Rh						MNSs				Pl	Lu		Kell			Le		Fy		Jk		Results			
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b	IAT	Enz/IAT		
1	R ₁ ^w R ₁	+	+	0	0	+	+	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0	3	5		
2	R ₁ R ₁	+	+	0	0	+	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+	3	5		
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+	1	4		
4	r'r	0	+	0	+	+	0	0	+	+	0	0	+	+	0	+	0	+	0	0	0	0	+	3	5		
5	r ^w r	0	0	+	+	+	0	0	+	+	+	3	0	+	0	+	0	0	+	+	0	+	0	3	5		
6	rr	0	0	0	+	+	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+	3	5		
7	rr	0	0	0	+	+	0	0	+	0	+	0	0	+	+	0	0	+	0	+	+	0	+	3	5		
8	rr	0	0	0	+	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	0	0	+	3	5		
9	rr	0	0	0	+	+	0	+	0	+	+	1	0	+	0	+	+	0	+	+	0	+	0	3	5		
10	rr	0	0	0	+	+	0	+	0	+	0	4	0	+	+	+	0	0	+	0	+	0	+	3	5		
Auto																								1			



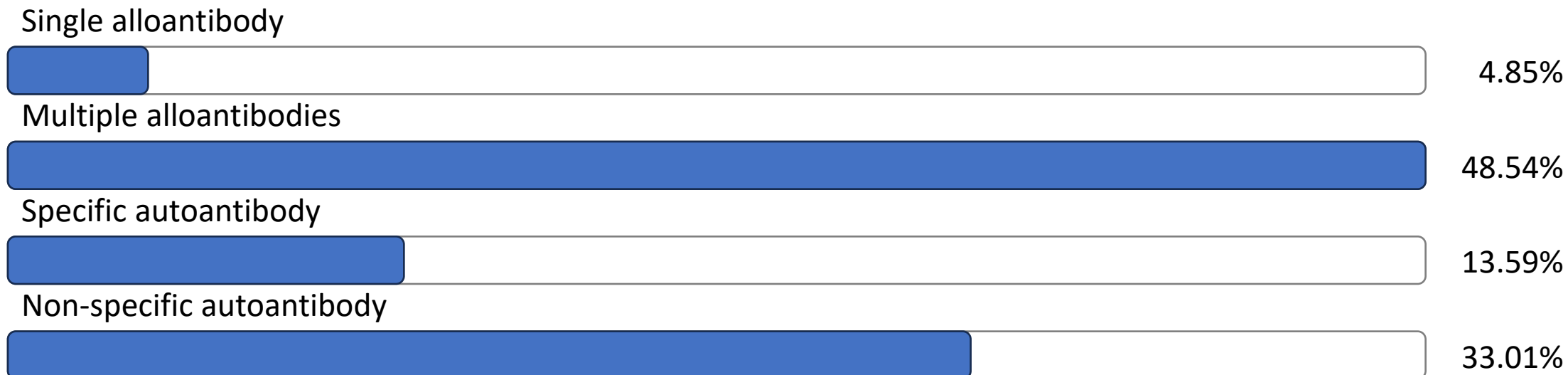
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Showing Results

What is causing these reactions?



RESULTS SLIDE



What would you like to do next?

Tube IAT panel

0%

Adsorption

0%

DTT treated panel

0%

Dilute the plasma

0%

Neutralisation

0%

DAT

0%

Something else

0%



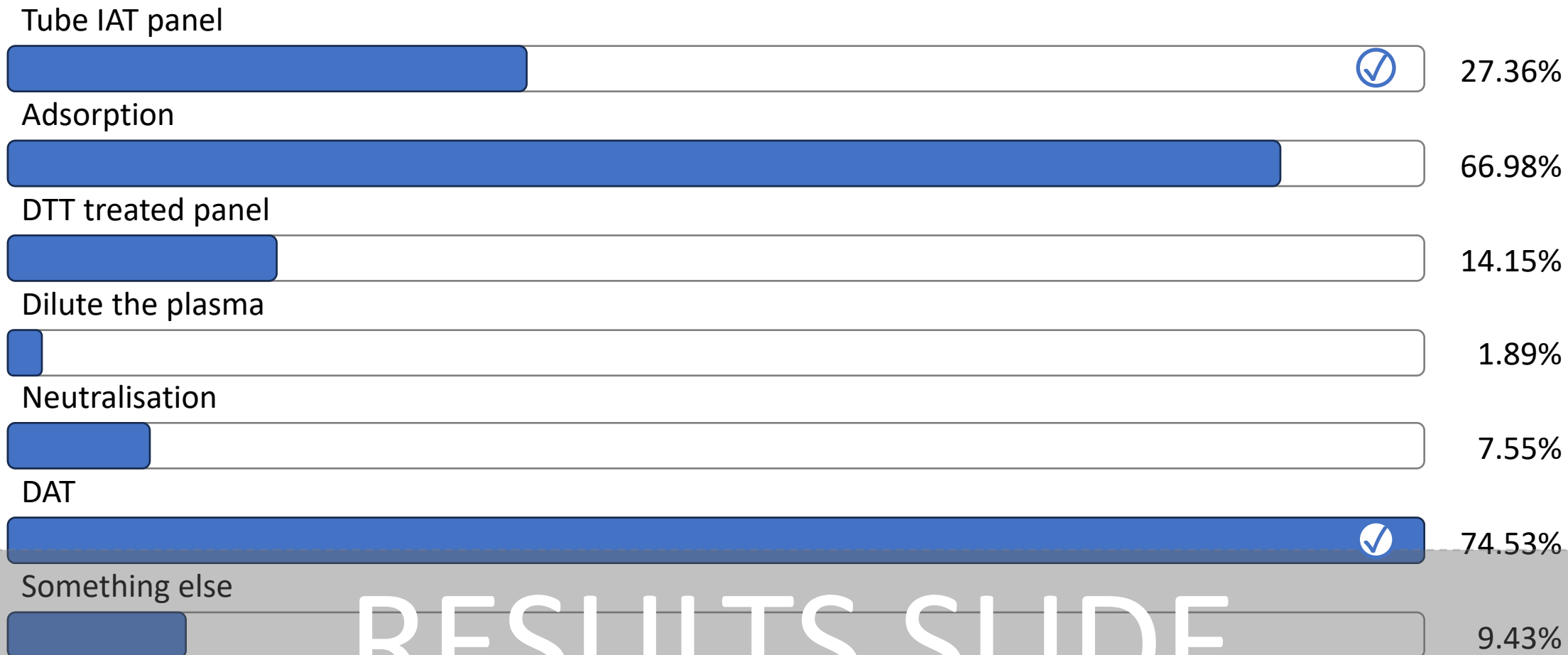
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ID: 110-551-368

Showing Results

What would you like to do next?



RESULTS SLIDE

What do we do now?

- Tube IAT
- Adsorb
- DTT
- Dilute
- Neutralise
- **DAT**

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₁ ^w R ₁	+	+	0	0	+	+	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₁ R ₁	+	+	0	0	+	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	r'r	0	+	0	+	+	0	0	+	+	0	0	+	+	0	+	0	+	0	0	0	0	+
5	r''r	0	0	+	+	+	0	0	+	+	+	3	0	+	0	+	0	0	+	+	0	+	0
6	rr	0	0	0	+	+	0	+	0	+	0	1	0	+	0	+	0	+	0	+	+	+	+
7	rr	0	0	0	+	+	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	rr	0	0	0	+	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	0	0	+
9	rr	0	0	0	+	+	0	+	0	+	+	1	0	+	0	+	+	0	+	+	0	+	0
10	rr	0	0	0	+	+	0	+	0	+	0	4	0	+	+	+	0	0	+	0	+	0	+
Auto																							

Results		
IAT	Enz/IAT	
3	5	
3	5	
1	4	
3	5	
3	5	
3	5	
3	5	
3	5	
3	5	
1		

What do we do now?

- Tube IAT
- Adsorb
- DTT
- Dilute
- Neutralise
- DAT

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₁ ^w R ₁	+	+	0	0	+	+	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₁ R ₁	+	+	0	0	+	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	r'r	0	+	0	+	+	0	0	+	+	0	0	+	+	0	+	0	+	0	0	0	0	+
5	r''r	0	0	+	+	+	0	0	+	+	+	3	0	+	0	+	0	0	+	+	0	+	0
6	rr	0	0	0	+	+	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+
7	rr	0	0	0	+	+	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	rr	0	0	0	+	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	0	0	+
9	rr	0	0	0	+	+	0	+	0	+	+	1	0	+	0	+	+	0	+	+	0	+	0
10	rr	0	0	0	+	+	0	+	0	+	0	4	0	+	+	+	0	0	+	0	+	0	+
Auto																							

Results		
IAT	Enz/IAT	
3	5	
3	5	
1	4	
3	5	
3	5	
3	5	
3	5	
3	5	
3	5	
1		

LISS tube Antibody ID Panel

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk		Results			
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b	IAT			
1	R ₁ ^w R ₁	+	+	0	0	+	+	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0				
2	R ₁ R ₁	+	+	0	0	+	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+				
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+				
4	r'r	0	+	0	+	+	0	0	+	+	0	0	+	+	0	+	0	+	0	0	0	0	+				
5	r''r	0	0	+	+	+	0	0	+	+	+	3	0	+	0	+	0	0	+	+	0	+	0				
6	rr	0	0	0	+	+	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+				
7	rr	0	0	0	+	+	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0				
8	rr	0	0	0	+	+	0	+	+	0	+	0	0	+	0	+	+	+	0	+	0	0	+				
9	rr	0	0	0	+	+	0	+	0	+	+	1	0	+	0	+	+	0	+	+	0	+	0				
10	rr	0	0	0	+	+	0	+	0	+	0	4	0	+	+	+	0	0	+	0	+	0	+				
Auto																											

Results			
IAT			
3			
3			
0			
3			
3			
3			
3			
3			
3			
3			
0			

LISS tube Antibody ID Panel

Cell	Rh	Rh					MNSs					P1	Lu		Kell			Le		Fy		Jk		Results		
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b	IAT		
1	R ₁ ^w R ₁	+	+	0	0	+	+	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0	3		
2	R ₁ R ₁	+	+	0	0	+	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+	3		
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+	0		
4	r'r	0	+	0	+	+	0	0	+	+	0	0	+	+	0	+	0	+	0	0	0	0	+	3		
5	r''r	0	0	+	+	+	0	0	+	+	+	3	0	+	0	+	0	0	+	+	0	+	0	3		
6	rr	0	0	0	+	+	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+	3		
7	rr	0	0	0	+	+	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0	3		
8	rr	0	0	0	+	+	0	+	+	0	+	0	0	+	0	+	+	+	0	+	0	0	+	3		
9	rr	0	0	0	+	+	0	+	0	+	+	1	0	+	0	+	+	0	+	+	0	+	0	3		
10	rr	0	0	0	+	+	0	+	0	+	0	4	0	+	+	+	0	0	+	0	+	0	+	3		
Auto																								0		

Blood / Report

- Report alloanti-e
- DAT negative
- 2 x Group O RhD+, C- e- K- compatible blood issued
- Antibody card issued
- Wait....

Further Actions

- Full phenotype / genotype?
- Even match further on 1st occasion?



would you do anything else at this stage or not?
(further phenotype / genotype, match blood
further)?

Phenotyping

0%

Genotype

0%

Match blood further

0%

Nothing - get it reported!

0%



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Showing Results

would you do anything else at this stage or not?
(further phenotype / genotype, match blood further)?

Phenotyping



Genotype



Match blood further



Nothing - get it reported!



RESULTS SLIDE

2nd RCI Referral

- Patient returns to RCI 3 weeks later
- 2 units requested
- Strait to Reference panel 2 (R2R2) panel by LISS tube technique

R₂R₂ tube IAT panel

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₂ R _z	+	+	+	+	0	0	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₂ R _z	+	+	+	+	0	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	0	0	+	0	+	0	+	0	0	0	0	+
5	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	3	0	+	0	+	0	0	+	+	0	+	0
6	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+
7	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	R ₂ R ₂	+	0	+	+	0	0	+	+	0	+	0	+	+	0	+	+	0	+	0	0	0	+
9	R ₂ R ₂	+	0	+	+	0	0	+	0	+	+	1	0	+	0	+	+	0	+	0	+	+	0
10	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	4	0	+	+	+	0	0	+	+	0	0	+
Auto																							

Results			
IAT			
1			
3			
3			
2			
1			
2			
1			
3			
2			
3			
0			



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Showing Results

What would you like to do now?

More R2R2 panel cells



Adsorbtion



DTT treated panel



Dilute the plasma



Neutralisation



RESULTS SLIDE

What do we do now?

- More R2R2 panel cells (where from?!)
- Adsorb
- DTT treated panel
- Dilute
- **Neutralise**

What do we do now?

- More R2R2 panel cells (where from?!)
- Adsorb
- DTT treated panel
- Dilute
- Neutralise with AB serum

Neutralisation of Anti-Ch/Rg

- Antigens are found on C4 component
- Binds to red cells from the plasma
- Incubate patient's plasma with serum from Ag positive individuals (AB serum)
- Inhibits the reaction
- Use Saline diluted plasma as control

Pre- Neutralised R_2R_2 panel

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₂ R _z	+	+	+	+	0	0	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₂ R _z	+	+	+	+	0	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	0	0	+	0	+	0	+	0	0	0	0	+
5	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	3	0	+	0	+	0	0	+	+	0	+	0
6	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+
7	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	R ₂ R ₂	+	0	+	+	0	0	+	+	0	+	0	+	+	0	+	+	0	+	0	0	0	+
9	R ₂ R ₂	+	0	+	+	0	0	+	0	+	+	1	0	+	0	+	+	0	+	0	+	+	0
10	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	4	0	+	+	+	0	0	+	+	0	0	+
Auto																							

Results			
IAT			
1			
3			
3			
2			
1			
2			
1			
3			
2			
3			
0			

Post Neutralisation R₂R₂ panel

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₂ R _Z	+	+	+	+	0	0	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₂ R _Z	+	+	+	+	0	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	0	0	+	0	+	0	+	0	0	0	0	+
5	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	3	0	+	0	+	0	0	+	+	0	+	0
6	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+
7	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	R ₂ R ₂	+	0	+	+	0	0	+	+	0	+	0	+	+	0	+	+	0	+	0	0	0	+
9	R ₂ R ₂	+	0	+	+	0	0	+	0	+	+	1	0	+	0	+	0	+	0	+	+	+	0
10	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	4	0	+	+	+	0	0	+	+	0	0	+
Auto																							

Results	
IAT (Abs)	IAT (Sal)
1	1
3	3
3	3
2	2
0	1
1	2
0	1
2	3
0	2
3	3
0	0

Post Neutralisation R₂R₂ panel

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₂ R _Z	+	+	+	+	0	0	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₂ R _Z	+	+	+	+	0	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	0	0	+	0	+	0	+	0	0	0	0	+
5	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	3	0	+	0	+	0	0	+	+	0	+	0
6	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+
7	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	R ₂ R ₂	+	0	+	+	0	0	+	+	0	+	0	+	+	0	+	+	0	+	0	0	0	+
9	R ₂ R ₂	+	0	+	+	0	0	+	0	+	+	1	0	+	0	+	0	+	0	+	+	+	0
10	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	4	0	+	+	+	0	0	+	+	0	0	+
Auto																							

Results	
IAT (Abs)	IAT (Sal)
1	1
3	3
3	3
2	2
0	1
1	2
0	1
2	3
0	2
3	3
0	0



Which antibodies are present?

Mart, I'm pretty sure it's anti-C+Jkb

0%

I ain't falling for the old 'anti-C+Jkb' chestnut - no way, Jose

0%

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₂ R ₂	+	+	+	+	0	0	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₂ R ₂	+	+	+	+	0	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	0	0	+	0	+	0	+	0	0	0	0	+
5	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	3	0	+	0	+	0	0	+	+	0	+	0
6	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+
7	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	R ₂ R ₂	+	0	+	+	0	0	+	+	0	+	0	+	+	0	+	+	+	0	+	0	0	+
9	R ₂ R ₂	+	0	+	+	0	0	+	0	+	+	1	0	+	0	+	+	0	+	0	+	+	0
10	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	4	0	+	+	+	0	0	+	+	0	0	+
Auto																							

Results	
IAT (Abs)	IAT (Sal)
1	1
3	3
3	3
2	2
0	1
1	2
0	1
2	3
0	2
3	3
0	0



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Showing Results

Which antibodies are present?

Mart, I'm pretty sure it's anti-C+Jkb



I ain't falling for the old 'anti-C+Jkb' chestnut - no way, Jose



RESULTS SLIDE

Post Neutralisation R₂R₂ panel

Cell	Rh	Rh						MNSs				P1	Lu		Kell			Le		Fy		Jk	
		D	C	E	c	e	C ^w	M	N	S	s		a	b	K	k	Kp ^a	a	b	a	b	a	b
1	R ₂ R _Z	+	+	+	+	0	0	+	0	+	0	0	0	+	0	+	0	+	0	+	0	+	0
2	R ₂ R _Z	+	+	+	+	0	0	+	0	0	+	2	0	+	+	0	0	0	+	+	0	0	+
3	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	3	0	+	0	+	0	0	+	0	+	0	+
4	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	0	0	+	0	+	0	+	0	0	0	0	+
5	R ₂ R ₂	+	0	+	+	0	0	0	+	+	0	3	0	+	0	+	0	0	+	+	0	+	0
6	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	1	0	+	0	+	0	+	0	0	+	+	+
7	R ₂ R ₂	+	0	+	+	0	0	0	+	0	+	0	0	+	+	+	0	0	+	0	+	+	0
8	R ₂ R ₂	+	0	+	+	0	0	+	+	0	+	0	+	+	0	+	+	0	+	0	0	0	+
9	R ₂ R ₂	+	0	+	+	0	0	+	0	+	+	1	0	+	0	+	0	+	0	+	+	+	0
10	R ₂ R ₂	+	0	+	+	0	0	+	0	+	0	4	0	+	+	+	0	0	+	+	0	0	+
Auto																							

Results	
IAT (Abs)	IAT (Sal)
1	1
3	3
3	3
2	2
0	1
1	2
0	1
2	3
0	2
3	3
0	0

Results

- Previously anti-e
- Now Anti-C + e + Jk^b + Ch/Rg
- R2R2 K- units issued last time
- ? Anti-C stimulated by previous transfusion
- Not detected until after 2nd transfusion
- R2R2 K- Jk^b- issued as 'suitable' (crossmatched with neutralised plasma)

'Techniques' Used

- Gel card technology
- Tube technology
- DAT
- Rare cell panel
- Neutralisation
- Knowledge
- Adsorption should be 'last resort'

Conclusions

- Patients produce alloantibodies
- Not necessarily strait away
- Don't mistake them for autoantibodies
- Don't panic, discuss it with colleagues
- Look at variation in strength / weaker or negative auto / enzyme reactivity
- It isn't over till its over!

Any Questions?

