MYSTERIES IN LABOR AND DELIVERY (LD)

BJC HealthCare

Barnes-Jewish Hospital, St. Louis, MO

Gino Gaytano, SBB(ASCP)^{CM},MLS(ASCP^{i})^{CM}

NO DISCLOSURES

Gino Gaytano

SBB(ASCP)^{CM},MLS(ASCP^{i})^{CM}

Technical Specialist, Transfusion Medicine
Barnes-Jewish Hospital, St. Louis, MO

- Bachelor of Science in Medical Technology
  Far Eastern University – Dr. Nicanor Reyes Medical Foundation (FEU-NRMF)
  Manila, Philippines
  1997
- Senior Laboratory Specialist
  Al-Amiri Hospital, Ministry of Health
  Kuwait City, Kuwait
  2000 to 2018
- International Medical Laboratory Scientist (MLS)
  ASCP Certification
  2018
- Specialist in Blood Bank
  ASCP Certification, November 2024

Case Study 1

- 31-year-old Hispanic female
- G2P1001 at 39w3d
- ABO/Rh is group O Rh positive
- Antibody detection test is negative
- Delivered a baby boy
- Submitted cord blood for routine testing

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Cord Blood Testing Results

Anti-A	Anti-B	Anti-D	ABO group	Rh group
0	0	4+	O	Positive

- ABO/Rh is group O Rh positive

	Anti-IgG	6% Alb	DAT	Control
IS	2+	0	Positive	Negative

- Direct antiglobulin test (DAT) with anti-IgG is positive (2+)

MYSTERY?!?

What antibody is coating the baby's red blood cells?

Additional Testing

- Antibody elution on cord blood
- Tested the eluate and last wash with 3-5% screening cells.

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Additional Testing Results

PANOSCREEN
Master List

412-13

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

LOT NO: 35890
EXPIRES: 2024/11/01

PANOSCREEN

VIAL	Donor			Rh - Hr						Kell						Duffy		Kidd		Lewis		P	MN				Luth-eran		Xg
	Barcode #	Add'l Typings	Rh Donor ID	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*}
I	198890		R1R1 B10595	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	+	0	0	+	0	+	0	0	+	+
II	298890		R2R2 C6729	+	0	+	+	0	0	+	+	0	+	0	+	+	0	0	+	0	+	+	+	0	+	+	0	+	+
III	398890		rr N4136	0	0	+	0	+	0	0	+	0	+	0	+	0	+	+	0	0	+	+	0	+	0	+	0	+	+

PANOSCREEN

* 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.

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				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*}	15' 37C PeG Anti-IgG		15' 37C PeG Anti-IgG		
I	198890		R1R1 B10595	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	+	0	0	+	0	+	0	0	+	+	0✓		0✓		
II	298890		R2R2 C6729	+	0	+	+	0	0	+	+	0	+	0	+	+	0	0	+	0	+	+	+	0	+	+	0	+	+	0✓		0✓		
III	398890		rr N4136	0	0	+	0	+	0	0	+	0	+	0	+	0	+	+	0	0	+	+	0	+	0	+	0	+	+	0✓		0✓		

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				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	P1	M	N	S	s	Lu^a	Lu^b	Xg^a*	15' 37C PeG Anti-IgG		15' 37C PeG Anti-IgG		
I	198890		R1R1 B10595	+		0	0		0	0		0		0		+	+		0		0	0		0		0	0			0✓		0✓		
II	298890		R2R2 C6729		0	+		0	0		+	0	+	0	+		0	0		0			+	0	+	+	0	+	+	0✓		0✓		
III	398890		rr N4136	0	0	+	0	+	0	0	+	0	+	0	+	0		+	0	0	+	+	0		0		0	+	+	0✓		0✓		

PANOSCREEN

* 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.

Additional Testing Results

- The eluate tested negative with all cells tested.
- All clinically significant antibodies are ruled out.
- Positive DAT still not explained.

Additional Testing Results

Panel A																																		
Vial No.	Rh-hr	Donor Number	Rh-Hr								Kell						Duffy		Kidd		Sex Link	Lewis		MNS				P	Lutheran				
			D	C	E	c	e	f	C^w	V	K	k	Kp^a	Kp^b	Js^a	Js^b	Fy^a	Fy^b	Jk^a	Jk^b	Xg^a	Le^a	Le^b	S	S	M	N	P_1	Lu^a	Lu^b			
1	R1wR1	320138	+	+	0	0	+	0	+	0	+	+	0	+	/	+	+	+	+	+	+	0	+	0	+	0	+	0	0	+			
2	R1R1	329796	+	+	0	0	+	0	0	0	0	+	0	+	/	+	+	0	0	+	+	0	+	+	+	+	0	0	0	+			
3	R2R2	327127	+	0	+	+	0	0	0	0	0	+	0	+	/	+	0	+	+	0	0	0	+	0	+	0	+	+s	0	+			
4	Ror	324293	+	0	0	+	+	+	0	+	0	+	0	+	/	+	0	0	+	+	0	0	0	+	+	+	+	+s	0	+			
5	r'r	329377	0	+	0	+	+	+	0	0	0	+	0	+	/	+	+	+	+	0	+	+	0	+	+	+	+	+s	0	+			
6	r"r	312611	0	0	+	+	+	+	0	0	0	+	0	+	/	+	+	+	+	+	+	0	+	+	+	+	+	+	0	+			
7	rr	332333	0	0	+	0	+	+	0	0	+	+	0	+	/	+	0	+	0	+	+	0	+	0	+	0	+	+	0	+			
8	rr	112641	0	0	+	0	+	+	0	0	0	+	0	+	0	+	+	+	+	0	+	+	0	+	+	+	0	+	0	+			
9	Rr	310738	0	0	+	0	+	+	0	0	0	+	0	+	/	+	+	+	0	+	+	0	0	+	0	+	0	0	0	+			
10	Rr	331644	0	0	+	0	+	+	0	0	0	+	0	+	/	+	+	0	+	+	0	0	0	0	+	+	+	+s	+	+			
11	R1R1	331425	+	+	0	0	+	0	0	0	0	+	0	+	/	+	0	+	+	+	+	0	+	+	0	+	+	+s	0	+			
																								Patient Cells (Auto control)									

Lot No. VRA468

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Additional Testing Results

Panel A																																		
Vial No.	Rh-hr	Donor Number	Rh-Hr								Kell						Duffy		Kidd		Sex Link	Lewis		MNS				P	Lutheran		Gel		
			D	C	E	c	e	f	C^w	V	K	k	Kp^a	Kp^b	Js^a	Js^b	Fy^a	Fy^b	Jk^a	Jk^b	Xg^a	Le^a	Le^b	S	S	M	N	P_1	Lu^a	Lu^b			
1	R1wR1	320138	+	+	0	0	+	0	+	0	+	+	0	+	/	+	+	+	+	+	+	0	+	0	+	0	+	0	0	+	0		
2	R1R1	329796	+	+	0	0	+	0	0	0	0	+	0	+	/	+	+	0	0	+	+	0	+	+	+	+	0	0	0	+	0		
3	R2R2	327127	+	0	+	+	0	0	0	0	0	+	0	+	/	+	0	+	+	0	0	0	+	0	+	0	+	+s	0	+	0		
4	Ror	324293	+	0	0	+	+	+	0	+	0	+	0	+	/	+	0	0	+	+	0	0	0	+	+	+	+	+s	0	+	0		
5	r'r	329377	0	+	0	+	+	+	0	0	0	+	0	+	/	+	+	+	+	0	+	+	0	+	+	+	+	+s	0	+	0		
6	r"r	312611	0	0	+	+	+	+	0	0	0	+	0	+	/	+	+	+	+	+	+	0	+	+	+	+	+	+	0	+	0		
7	rr	332333	0	0	+	0	+	+	0	0	+	+	0	+	/	+	0	+	0	+	+	0	+	0	+	0	+	+	0	+	0		
8	rr	112641	0	0	+	0	+	+	0	0	0	+	0	+	0	+	+	+	+	0	+	+	0	+	+	+	0	+	0	+	0		
9	Rr	310738	0	0	+	0	+	+	0	0	0	+	0	+	/	+	+	+	0	+	+	0	0	+	0	+	0	0	0	+	0		
10	Rr	331644	0	0	+	0	+	+	0	0	0	+	0	+	/	+	+	0	+	+	0	0	0	0	+	+	+	+s	+	+	0		
11	R1R1	331425	+	+	0	0	+	0	0	0	0	+	0	+	/	+	0	+	+	+	+	0	+	+	0	+	+	+s	0	+	0		
																														Patient Cells (Auto control)	0		

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Additional Testing Results

Panel A																																	
Vial No.	Rh-hr	Donor Number	Rh-Hr								Kell						Duffy		Kidd		Sex Link	Lewis		MNS				P	Lutheran		Gel		
			D	C	E	c	e	f	V	K	k	Kp^a	Kp^b	Js^a	Js^b	Fy^a	Fy^b	Jk^a	Jk^b	Xg^a	Le^a	Le^b	S	s	M	N	P_1	Lu^a	Lu^b			
1	R1wR1	320138	+	+	0	0	+	0	+	0	+	+	0	+	/	+	+	+	+	+	+	0	+	0	+	0	+	0	0	+	0		
2	R1R1	329796	+	+	0	0	+	0	0	0	0	+	0	+	/	+	+	0	0	+	+	0	+	+	+	+	0	0	0	+	0		
3	R2R2	327127	+	0	+	+	0	0	0	0	0	+	0	+	/	+	0	+	+	0	0	0	+	0	+	0	+	+s	0	+	0		
4	Ror	324293	+	0	0	+	+	+	0	+	0	+	0	+	/	+	0	0	+	+	0	0	0	+	+	+	+	+s	0	+	0		
5	r'r	329377	0	+	0	+	+	+	0	0	0	+	0	+	/	+	+	+	+	0	+	+	0	+	+	+	+	+s	0	+	0		
6	r"r	312611	0	0	+	+	+	+	0	0	0	+	0	+	/	+	+	+	+	+	+	0	+	+	+	+	+	+	0	+	0		
7	rr	332333	0	0	+	0	+	+	0	0	+	+	0	+	/	+	0	+	0	+	+	0	+	0	+	0	+	+	0	+	0		
8	rr	112641	0	0	+	0	+	+	0	0	0	+	0	+	0	+	+	+	+	0	+	+	0	+	+	+	0	+	0	+	0		
9	Rr	310738	0	0	+	0	+	+	0	0	0	+	0	+	/	+	+	+	0	+	+	0	0	+	0	+	0	0	0	+	0		
10	Rr	331644	0	0	+	0	+	+	0	0	0	+	0	+	/	+	+	0	+	+	0	0	0	0	+	+	+	+s	+	+	0		
11	R1R1	331425	+	+	0	0	+	0	0	0	0	+	0	+	/	+	0	+	+	+	+	0	+	+	0	+	+	+s	0	+	0		
																														Patient Cells (Auto control)	0		

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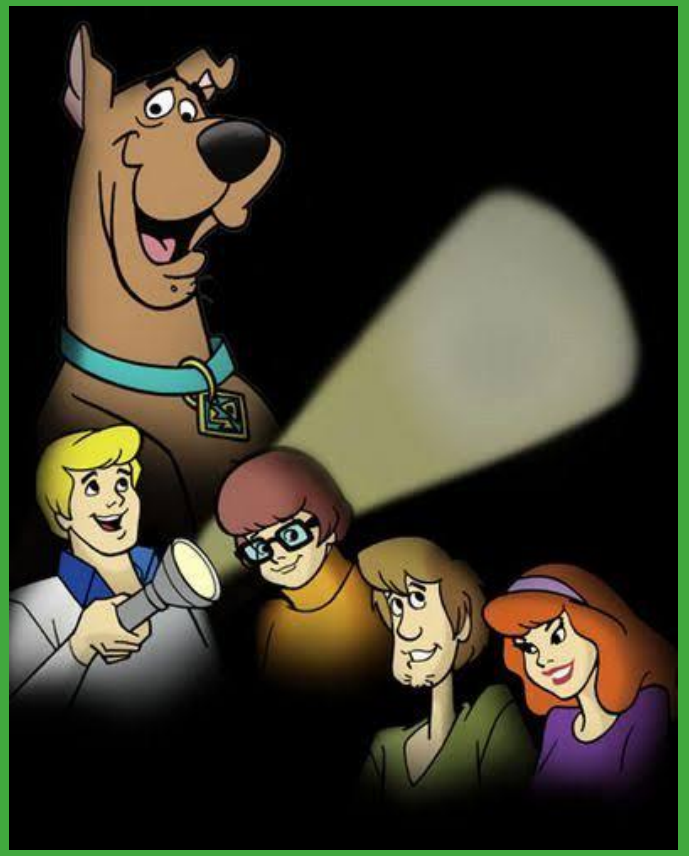
Additional Testing on Mother's sample

- Performed antibody identification panel on mother's plasma using gel column agglutination test (CAT).



- The mother's plasma tested negative with all cells.
- All clinically significant antibodies ruled out.

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Additional Testing

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type			
			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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)			
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+				
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+				
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)			
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)			
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)			

Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type			
			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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)			
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+				
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+				
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)			
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)			
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)			

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Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Gel		
			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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		

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Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Gel		
			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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		

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4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		

BJC HealthCare

Barnes-Jewish Hospital, St. Louis, MO

Gino Gaytano, SBB(ASCP)CM,MLS(ASCPi)CM

Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Gel		
			D	C	c	E	e	C^w	K	k	Ku^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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		

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Gino Gaytano, SBB(ASCP)CM,MLS(ASCPi)CM

Additional Testing on Mother's sample

- A panel of low-frequency antigens (LFA) that is available was tested against the mother's plasma using gel column agglutination test (CAT).

- Of the available LFA in our panels, anti-Co^{b}, anti-Kp^{a}, anti-Js^{a}, anti-Lu^{a}, anti-Wr^{a}, and anti-Yt^{b} were ruled out.
- One cell that was positive for the Di^{a} antigen tested positive.
- Run additional Di(a+) cells.

Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Gel		
			D	C	c	E	e	C^w	K	k	K_0^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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		
10	Immucor 30002	RzR_2 A3585	+	w	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	0	+	0	+	+	Di(a+)			
6	Immucor 34790	r"r F872	0	0	+	+	+	0	0	+	0	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	+	0	Di(a+)			

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Barnes-Jewish Hospital, St. Louis, MO

Gino Gaytano, SBB(ASCP)CM,MLS(ASCPi)CM

Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Gel		
			D	C	c	E	e	C^w	K	k	K_0^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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		
10	Immucor 30002	RzR_2 A3585	+	w	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	0	+	0	+	+	Di(a+)	3+		
6	Immucor 34790	r"r F872	0	0	+	+	+	0	0	+	0	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	+	0	Di(a+)	3+		

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Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Gel		
			D	C	c	E	e	C^w	K	k	Ku^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				
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		
10	Immucor 30002	RzR_2 A3585	+	w	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	0	+	0	+	+	Di(a+)	3+		
6	Immucor 34790	r"r F872	0	0	+	+	+	0	0	+	0	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	+	0	Di(a+)	3+		

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Gino Gaytano, SBB(ASCP)CM,MLS(ASCPi)CM

Additional Testing on Mother's sample

- 2 additional Di(a+) cells also tested positive.

Anti-Co^{b} Anti-Kp^{a} Anti-Js^{a} Anti-Lu^{a} Anti-Wr^{a} Anti-Yt^{b} Anti-Di^{a}

- 3-on-3 rule in antibody identification confirms the presence of anti-Di^{a} in the mother's plasma

Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Eluate		
			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		15' 37°C PeG Anti-IgG		
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)			
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+				
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+				
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)			
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)			
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)			
10	Immucor 30002	RzR_2 A3585	+	w	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	0	+	0	+	+	Di(a+)			
6	Immucor 34790	r"r F872	0	0	+	+	+	0	0	+	0	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	+	0	Di(a+)			

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Gino Gaytano, SBB(ASCP)CM,MLS(ASCPi)CM

Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Eluate		
			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		15' 37°C PeG Anti-IgG		
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	Co(b+)	0✓		
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	+	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0✓		
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	+	0	0	0	+	+	0	0	+	0	+	0	+	+	+	+		0✓		
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	Wr(a+)	0✓		
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	Yt(b+)	0✓		
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+		
10	Immucor 30002	RzR_2 A3585	+	w	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	0	+	0	+	+	Di(a+)	3+		
6	Immucor 34790	r"r F872	0	0	+	+	+	0	0	+	0	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	+	0	Di(a+)	3+		

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Additional Testing Results

Vial No.	Manufacturer and Lot No.	Donor	Rh-Hr						Kell						Duffy		Kidd		Lewis		P	MNS				Lutheran		Sex Link	Special Type	Eluate
			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		15' 37°C PeG Anti-IgG
4	Immucor 34796	R_1R_1 B10135	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	+	0	+	+	+	0	+	0	0	+	+	~~Co~~(b+)	0✓
10	Immucor 34790	R_1r R4088	+	+	+	0	+	0	0	+	~~+~~	+	0	+	0	+	0	+	0	+	+	0	+	0	+	0	+	+		0✓
4	Immucor 34790	Ror D985	+	0	+	0	+	0	0	+	0	+	~~+~~	0	0	0	+	+	0	0	+	0	+	0	+	~~+~~	+	+		0✓
TC	Immucor 33784	R_1R_1 B2849	+	+	0	0	+	0	0	+	0	+	0	+	+	0	+	+	+	0	+	0	+	0	+	0	+	+	~~Wr~~(a+)	0✓
10	Immucor 36806	R_1R_1 B3685	+	+	0	0	+	0	+	+	0	+	0	+	+	+	+	+	0	+	+	+	+	+	+	0	+	+	~~Yt~~(b+)	0✓
9	Immucor 32777	R_1R_1 B9603	+	+	0	0	+	0	0	+	+	+	0	+	+	+	+	+	+	0	+	+	0	0	+	0	+	+	Di(a+)	3+
10	Immucor 30002	RzR_2 A3585	+	w	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	0	+	0	+	+	Di(a+)	3+
6	Immucor 34790	r"r F872	0	0	+	+	+	0	0	+	0	+	0	+	+	0	+	0	0	+	0	+	+	0	+	0	+	0	Di(a+)	3+

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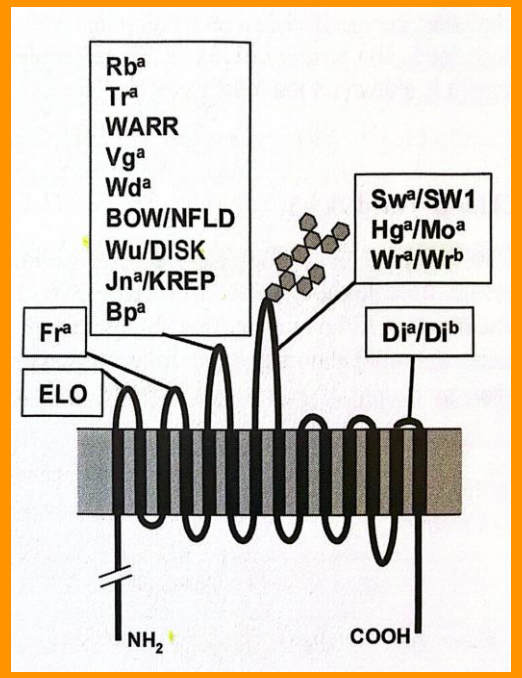
Additional Testing on the cord blood eluate

- Eluate from the cord blood tested against the same panel for the LFA
- The testing on the eluate confirms that anti-Di^{a} (passively acquired from the mom) is coating the baby's red blood cells that caused the positive DAT.

The DI (Diego) Blood Group System (010)

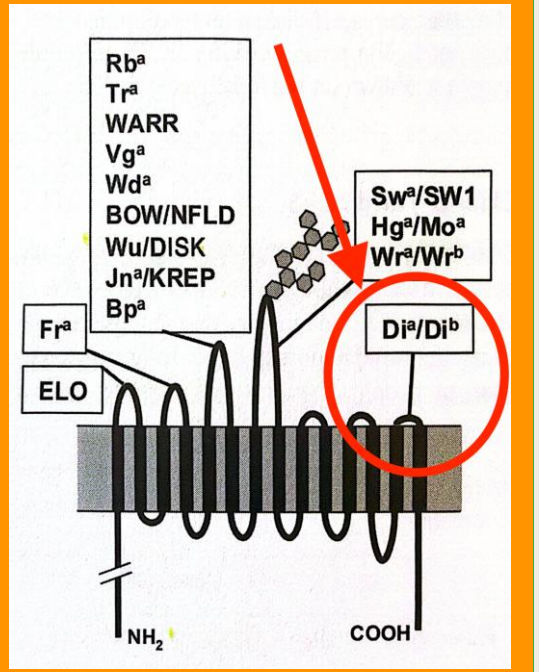
DI Antigens

- 23 antigens
- Located on band 3
  - *Red cell anion exchanger*
  - *A major red cell membrane glycoprotein with ~10^6 copies per red cell*
  - *Red cell structural integrity*
  - *Transmembrane domain (14x)*
- Located on chromosome 17q21.31 with 20 exons



The DI (Diego) Blood Group System (010)

Di^a (DI1)



- The original DI antigen
- Very rare in people of European and African ancestry
- 5% prevalence in people of Chinese or Japanese ancestry
- Higher prevalence in the indigenous people of North and South America
- Up to 54% in the Kainanges Indians of Brazil
- Amino acid substitution in 7th extracellular loop of band 3: Leu854

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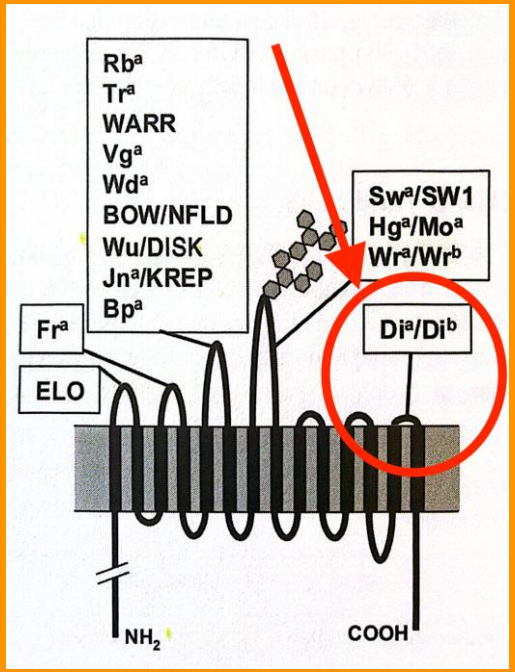
The DI (Diego) Blood Group System (010)

Di^b (DI2)

- A high-prevalence antigen
- Amino acid substitution in 7th extracellular loop of band 3: Pro854



Antibodies to Diego Antigens

Anti-Di^a and -Di^b

- Both usually IgG1 plus IgG3
- Can induce decreased red cell survival (hemolysis)
- Requires indirect antiglobulin test (IAT) for detection
- Generally, do not cause hemolytic transfusion reactions (HTR)

	Anti-Di^a	Anti-Di^b
Antibody presence	Present in ~3.6% of multiple-transfusion recipients in Brazil	Rare
Hemolytic disease of the fetus and newborn (HDFN)	Can cause severe HDFN	Rare
Delayed reaction	One report	Rare

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Baby with positive DAT due to passively acquired anti-Di[a]

DELIVERY

- Well appearing
- Grunting, nasal flaring, coarse lung sounds, mild work of breathing (WOB)
- Transient tachypnea of the newborn (TTN)
- Neonatal ICU – Bubble continuous positive airflow pressure (CPAP) due to persistent grunting

Baby with positive DAT due to passively acquired anti-Di[a]

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Laboratory Tests

Bilirubin levels					
Bilirubin	5h	8h	36h		Normal Values (NV)
Total	5.1▲	5.3▲	8.1▲		0.0-5.0 mg/dL 0.0-8.0 mg/dL
Direct	H	0.3	0.6▲		0.0-0.4 mg/dL
D/T Ratio	N/A	0.1	0.1		</= 0.2

Hemoglobin levels				
Hgb/Hct	8h	36h		Normal Values (NV)
Hgb	13.0▼	15.7		14.5-22.5 g/dL
Hct	38.4▼	45.1		45.0-66.0%

- Bilirubin levels below neurotoxicity risk curve for phototherapy

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Baby with positive DAT due to passively acquired anti-Di^{a}

Summary

HDFN

- Diagnosed, mild
- Required CPAP briefly for TTN
- Bilirubin levels not at the level to require phototherapy

Mom

- No hemolysis
- Hgb 15.7 g/dL
- Discharged

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Baby with positive DAT due to passively acquired anti-Di^{a}

Laboratory Tests

Bilirubin levels					
Bilirubin	5h	8h	36h	15d	Normal Values (NV)
Total	5.1▲	5.3▲	8.1▲	2.0	0.0-5.0 mg/dL 0.0-8.0 mg/dL
Direct	H	0.3	0.6▲	0.2	0.0-0.4 mg/dL
D/T Ratio	N/A	0.1	0.1	N/A	</= 0.2

Hemoglobin levels				
Hgb/Hct	8h	36h	15d	Normal Values (NV)
Hgb	13.0▼	15.7	10.6	14.5-22.5 g/dL 10.0-18.0 g/dL
Hct	38.4▼	45.1	29.4▼	%

- No jaundice of skin or eyes
- No shortness of breath (SOB)

Healthy baby

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Case Study 2

- 23-year-old African-American female
- Sickle cell trait
- G2P1001 at 37w4d
- ABO/Rh is group O, Rh positive
- Antibody detection test is positive with Anti-C detected
- Anti-C titer is 0 (zero)
- Delivered a baby girl
- Submitted cord blood for routine testing

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Cord Blood Testing Results

Anti-A	Anti-B	Anti-D	ABO group	Rh group
0	4+	4+	B	Positive

- ABO/Rh is group B, Rh positive

	Anti-IgG	6% Alb	DAT	Control
IS	m+ (microscopic)	0	Positive	Negative

- DAT with anti-IgG is positive (microscopic +), with negative control
- Remember, Mom: group O (ABO incompatible)

MYSTERY?!?

Which antibody is coating the baby's red blood cells?

Anti-C or Anti-A,B?

Additional Testing

- Antibody elution on cord blood
- Tested the eluate and last wash with 3-5% screening cells.

Additional Testing Results

PANOSCREEN
Master List

412-13

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

LOT NO: 35890
EXPIRES: 2024/11/01

PANOSCREEN

VIAL	Donor			Rh - Hr						Kell						Duffy		Kidd		Lewis		P	MN				Luth-eran		Xg
	Barcode #	Add'l Typings	Rh Donor ID	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*}
I	198890		R1R1 B10595	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	+	0	0	+	0	+	0	0	+	+
II	298890		R2R2 C6729	+	0	+	+	0	0	+	+	0	+	0	+	+	0	0	+	0	+	+	+	0	+	+	0	+	+
III	398890		rr N4136	0	0	+	0	+	0	0	+	0	+	0	+	0	+	+	0	0	+	+	0	+	0	+	0	+	+

PANOSCREEN

* 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.

Additional Testing Results

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VIAL	Donor			Rh - Hr						Kell						Duffy		Kidd		Lewis		P	MN				Luth-eran		Xg	Eluate		Last Wash		
	Barcode #	Add'l Typings	Rh Donor ID	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*	15' 37C PeG Anti-IgG		15' 37C PeG Anti-IgG		
I	198890		R1R1 B10595	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	+	0	0	+	0	+	0	0	+	+	0✓		0✓		
II	298890		R2R2 C6729	+	0	+	+	0	0	+	+	0	+	0	+	+	0	0	+	0	+	+	+	0	+	+	0	+	+	0✓		0✓		
III	398890		rr N4136	0	0	+	0	+	0	0	+	0	+	0	+	0	+	+	0	0	+	+	0	+	0	+	0	+	+	0✓		0✓		

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VIAL	Donor Barcode #	Add'l Typings	Rh Donor ID	Rh - Hr						Kell						Duffy		Kidd		Lewis		P	MN				Luth-eran		Xg	Eluate		Last Wash		
				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	P1	M	N	S	s	Lu^a	Lu^b	Xg^a*	15' 37C PeG Anti-IgG		15' 37C PeG Anti-IgG		
I	198890		R1R1 B10595	+		0	0		0	0		0		0		+	+		0		0	0		0		0	0			0✓		0✓		
II	298890		R2R2 C6729		0	+		0	0		+	0	+	0	+		0	0		0			+	0	+	+	0	+	+	0✓		0✓		
III	398890		rr N4136	0	0	+	0	+	0	0	+	0	+	0	+	0		+	0	0	+	+	0		0		0	+	+	0✓		0✓		

PANOSCREEN

* 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.

Additional Testing Results

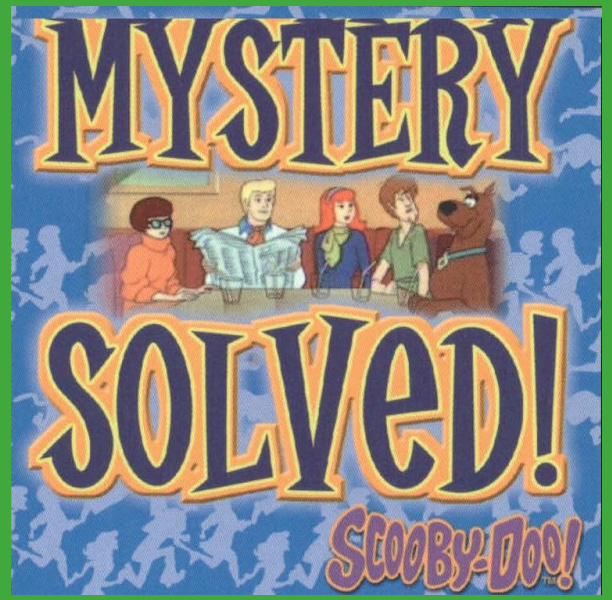
- The eluate tested negative with all cells tested.
- All antibodies including mom's anti-C are ruled out
- Positive DAT probably due to anti-A,B
- Remember, Mom is group O, and Baby is group B.
- The eluate was tested against A1 and B cells.

Additional Testing Results

Cells	Lot No.	Eluate 15’ 37°C PeG Anti-IgG
A1 Cells	A072	W+
B Cells	A072	W+

Additional Testing Results

- Positive reactivity of the eluate against the A1 and B cells confirms that anti-A,B is coating the baby's red cells that caused the positive DAT.



The ABO Blood Group System (001)

Anti-A,B

- From group O individuals
- Reactive with both A and B cells
- Anti-A and anti-B reactivity cannot be separated by differential adsorption
- Recognizes a common epitope shared by both A and B antigens – ISBT acknowledged A,B as the 3rd antigen of the ABO blood group system
- Reactivity against both A and B cells can be inhibited by A or B substance secreted in saliva
- ABO-associated HDFN < RhD-associated HDFN

Baby with positive DAT due to passively acquired anti-A,B

DELIVERY

- Early term delivery (37w4d)
- Healthy appearing
- No other concerns
- All delivery examinations were normal (respiratory, cardiovascular and neurologic)
- Concerns for hyperbilirubinemia

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Baby with positive DAT due to passively acquired anti-A,B

Laboratory Tests

Hemoglobin levels			
Hgb/Hct	3h	60h	Normal Values (NV)
Hgb	18.6	18.1	14.5-22.5 g/dL
Hct	55.0	51.1	45.0-66.0%

Bilirubin levels							
Bilirubin	8h	20h	32h	46h	54h	58h	Normal Values (NV)
Total	4.2	5.8▲	8.9▲	10.4▲	13.1▲	13.2▲	0.0-5.0 mg/dL 0.0-8.0 mg/dL
Direct	0.4	0.6▲	0.3	1.1▲	0.8▲	0.6▲	0.0-0.4 mg/dL
D/T Ratio	1.0	0.1	0.0	0.1	0.1	0.0	</= 0.2

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Baby with positive DAT due to passively acquired anti-A,B

Laboratory Tests

- Bilirubin levels below neurotoxicity risk curve for phototherapy

Bilirubin levels							
Bilirubin	3d	3d 12h	4d	5d	6d	7d	Normal Values (NV)
Total	15.2▲	14.8▲	14.7▲	16.1▲	15.2▲	14.4▲	0.0-8.0 mg/dL
Direct	0.8▲	0.6▲	0.9▲	0.5▲	0.6▲	0.7▲	0.0-0.4 mg/dL
D/T Ratio	0.1	0.0	0.1	0.0	0.0	0.0	</= 0.2

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Baby with positive DAT due to passively acquired anti-A,B

Summary

HDFN

- No concerns
- Constant monitoring of bilirubin levels
- Bilirubin levels not at the level to require phototherapy

Mom

- No hemolysis
- Hgb 11.7 g/dL
- Discharged

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REFERENCES

AABB Technical Manual, 21st Edition

QUESTIONS

Thank you!

HAABB

Cindy Ingold

Dr. Suzanne Thibodeaux

Thank you!

BJC HealthCare

Barnes-Jewish Hospital, St. Louis, MO

Gino Gaytano, SBB(ASCP)CM,MLS(ASCPi)CM

Gino Gaytano

SBB(ASCP)^{CM},MLS(ASCP^{i})^{CM}

Gino.Gaytano@bjc.org

BJC HealthCare

Barnes-Jewish Hospital, St. Louis, MO