

**IMMEDIATE HEMOLYTIC TRANSFUSION REACTION IN A PATIENT  
WITH A NEGATIVE BLOOD GROUP ANTIBODY DETECTION TEST**

Case Study by Jim Perkins, M.D. (©2009)

A 82 year old nulligravid woman with gouty arthritis was undergoing her fourth total knee arthroplasty. Initial arthroplasties were performed 16 and 13 years prior, and the first revision arthroplasty was performed 3 years earlier; on each occasion she received allogeneic RBCs. Pretransfusion testing results were unremarkable at each occasion, and the current results were as follows:

**ABO and Rh Typing**

	Anti-		Test Cells		Anti-			Interp.	
	A	B	A1	B	D	Du	Cont	ABO	Rh
IS	0	0	4+	4+	4+			O	Pos

**Antibody detection test (4 drops serum, 1 drop saline suspended RBCs)**

	IS	30'37°C	AHG	CC
OI	0	0	0	2+
OII	0	0	0	2+
OIII	0	0	0	2+

Units were crossmatched per routine procedure (compatible at immediate spin). The patient received no units intraoperatively but one unit of RBCs was given several hours post-op without incident. On the first post-op day her hematocrit was 24.5 and a second unit of allogeneic RBCs was started. Two hours after the start of transfusion the patient felt cold and was noted to be shivering. The transfusion was stopped and a transfusion reaction workup was ordered.

The course of her vital signs is shown below:

	BP	PR	T
Pre-transfusion	140/70	88	99 <sup>4</sup>
@ reaction	121/78	141	99 <sup>3</sup>
45" post-transfusion	110/60	104	101 <sup>2</sup>

The transfusion reaction workup yielded the following results:

Clerical check: No errors  
 Inspection of the serum for hemoglobin: Negative  
 Direct Antiglobulin Test: Positive

	POLY	IgG	C3
Pre-transfusion	vw+	0	0
Post-transfusion	w+, mf	vw+, mf	vw+, mf

**QUESTION:**

1. On the basis of these findings, should any additional testing be performed? What test(s)?

**ADDITIONAL TESTING:**

A repeat “type-and-screen” was performed on both pre- and post-transfusion specimens, and on the donor unit. In addition, a crossmatch utilizing an anti-human globulin phase was performed with each specimen and the donor RBCs.

Repeat ABO and Rh Typing

	Anti-		Test Cells		Anti-			Interp.	
	A	B	A1	B	D	AHG	Cntrl	ABO	Rh
Pre- specimen	0	0	4+	4+	4+			O	Pos
Post- specimen	0	0	4+	4+	4+			O	Pos
Donor unit	0	0	4+	4+	0	0		O	Neg

Antibody detection test (4 drops serum, 1 drop saline suspended RBCs) and crossmatches

	Pre-transfusion Specimen				Post-transfusion Specimen			
	IS	30'37°	AHG	CC	IS	30'37°	AHG	CC
OI	0	0	0	2+	0	0	0	2+
OII	0	0	0	2+	0	0	0	2+
OIII	0	0	0	2+	0	0	0	2+
Donor RBCs	0	0	3+		0	0	3+	

**DISCUSSION QUESTION:**

2. What type of antibody could cause a positive crossmatch but not be detected in the antibody detection test (antibody screen)? What testing would you like to do next to identify the antibody?

A search for an antibody against a low frequency antigen was initiated and eluates were prepared from pre- and post-transfusion RBCs which reacted as shown below.

Cell	I.D. #	Rh system						Kell						Duffy		Kidd		Xg	Lewis		MNSs					P	Lutheran		Other Typings		Post-Serum	Eluate		
		D	C	E	c	e	V	K	k	Kp <sup>a</sup>	Kp <sup>b</sup>	Js <sup>a</sup>	Js <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	Jk <sup>a</sup>	Jk <sup>b</sup>	Xg <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	M	N	S	s	P1	Lu <sup>a</sup>	Lu <sup>b</sup>	Pre-				Post-		
1	21420	0	+	0	+	+	0	0	+	0	+	0	+	+	+	+	+	+	0	0	+	0	+	+	0	+	+	+	+	Co <sup>b</sup> +	1	0		
2	214401	0	0	+	+	+	0	0	+	0	+	0	+	0	+	+	+	+	0	+	+	0	0	+	0	0	+	+	Wr <sup>a</sup> +	2	4+	0	3+	
3	611088	+	+	0	0	+	0	+	+	0	+	0	+	+	+	0	+	0	0	+	+	+	0	+	+	+	+	C <sup>w</sup> +	3	0				
4	110998	0	0	0	+	+	0	0	+	+	+	0	+	0	+	+	+	+	0	+	0	+	0	+	+	0	+		4	0				
5	2868	0	w+	0	+	+	+	0	+	0	+	0	+	0	+	+	+	0	+	0	0	+	0	+	+	0	+	VS+	5	0				
6	8810	+	+	0	0	+	0	0	+	0	+	0	+	0	+	+	+	0	0	+	+	0	+	0	0	+	+	Di <sup>a</sup> +	6	0				
7	6243	0	0	0	+	+	0	+	+	0	+	0	+	0	+	+	+	0	+	0	+	+	+	0	+	0	+	Yt <sup>b</sup> +	7	0				
8	B990	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	+	+	0	0	+	0	+	+	w	+	+	Wr <sup>a</sup> +	8	4+	0	4+	
9	I-E7	+	0	+	+	+	0	0	+	0	+	0	+	+	+	+	+	0	0	+	+	+	+	+	+	+	0	+	Wr <sup>a</sup> +	9	4+	0	3+	
10	I-A4	+	0	+	+	+	0	0	+	0	+	0	+	0	+	+	+	0	+	0	+	0	+	+	+	+	0	+	Wr <sup>a</sup> +	10	4+			
OI																													OI		0	0		
OII																													OII		0	0		
OIII																													OIII		0	0		
Patient																													AC		0	0		

**DISCUSSION QUESTIONS:**

3. What is the antibody that caused this reaction?
  
4. Why is the eluate from the post-transfusion specimen reactive, but that from the pre-transfusion specimen is not? Did the patient only express detectible levels of the antibody after transfusion?
  
5. How often does this sequence of events occur when the crossmatch is limited to immediate spin reading when the antibody screen is negative (see Perkins JT, et al. Transfusion. 30;503-7:1990)