In The Name Of GOD

Antibody screening and RBC phenotype

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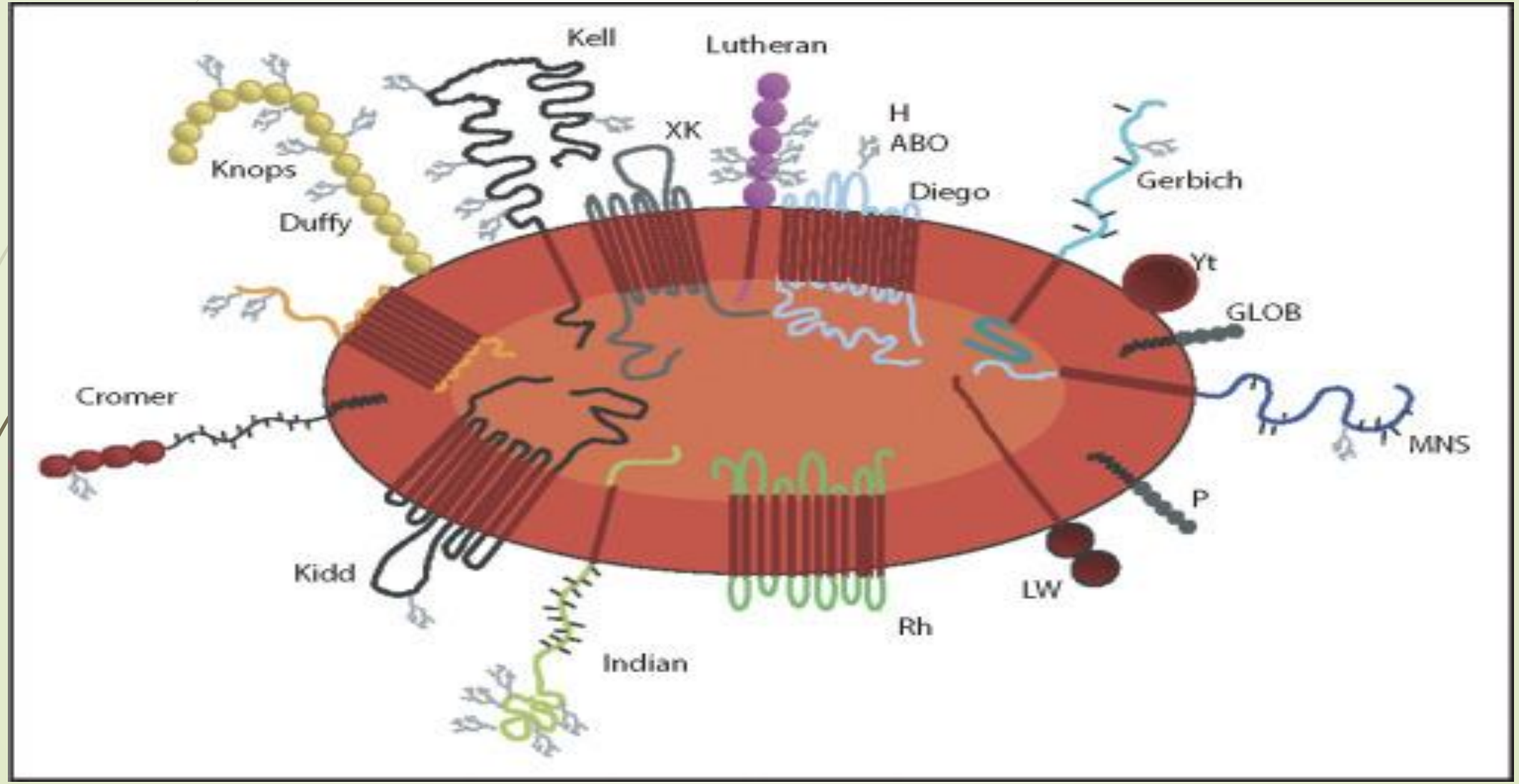
RBC phenotype



Potentially clinically significant antibody

- Associated with HDFN.
- Associated with HTR.
- Notably decreased survival of transfused red cells.
- Reactive at either 37 C or in the AHG test phase are more likely to be clinically significant than cold-reactive antibodies.

Antibodies to red cell antigens

- In chronically transfused patient ~14% to 50% are reported to be alloimmunized.

- Antibodies detected in serologic tests may be passively acquired.

-Injected immunoglobulin.

-Donor plasma.

-Passenger lymphocytes in transplanted organs.

-Hematopoietic progenitor cells (HPCs).

PREANALYTICAL CONSIDERATIONS

- *Mycoplasma pneumoniae* (anti-1)
- Infectious mononucleosis (anti-i).
- Patients with paroxysmal cold hemoglobinuria(anti-P).
- Warm autoantibodies (systemic lupus erythematosus, multiple myeloma, chronic lymphocytic leukemia, or lymphoma).
- solid-organ or HPC transplants (passive antibodies).
- Drugs
- (IVIG) and (RhIG) can interfere with antibody-screening tests.

Antibody Screening

Cell	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				
R1R1	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	+	0	+	+	+	+	+	0	+	+				
R2R2	+	0	+	+	0	0	+	+	0	+	0	+	+	0	0	+	0	+	0	0	0	+	0	0	+	+				
rr	0	0	+	0	+	0	0	+	0	+	0	+	0	+	+	+	0	+	+	+	+	0	+	0	+	+				

Figure 10–2. Antigen profile of three-cell screen set.

Antibody identification

- Reagent red cells licensed by FDA for this purpose must express the following antigens: D, C, E, c, e, M, N, S, s, P1, Lea, Leb, K, k, Fya, Fyb, Jka, and Jkb.
- Homozygous donors with double-dose expression for the following common antigens: D, C, E, c, e, M, N, S, s, Fya, Fyb, Jka, and Jkb.
- Antibodies in the Rh, MNS, Duffy, and Kidd systems most commonly demonstrate dosage.

Table 10–2 Optimal Phase of Reactivity for Some Common Alloantibodies

Phase	Immediate Spin (Room Temperature)	37°C Incubation	Antiglobulin Phase
Antibodies	Le^a, Le^b	Potent cold (IgM) antibodies (especially those causing hemolysis)	Rh antibodies
	M, N	Some warm antibodies, if high in titer (e.g., D, E, and K)	Kell
	Lu^a		Duffy
	P_1		Kidd
			S,s
			Lu^b

Antibody identification

Donor	Cell number	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
R1R1	1	+	+	0	0	+	0	0	+	0	+	0	+	+	+	+	0	0	+	+	+	+	+	+	0	+	+
R1wR1	2	+	+	0	0	+	+	+	+	0	+	0	+	+	0	0	+	0	+	0	+	0	+	+	0	+	+
RzR1	3	+	+	0	+	+	0	0	+	0	+	0	+	0	+	+	+	0	+	+	0	+	0	+	0	+	+
R2R2	4	+	0	+	+	0	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	+	0	0	+	+
r'r	5	0	+	+	0	+	0	0	+	0	+	0	+	0	0	0	+	+	0	+	+	0	+	+	0	+	0
r"r	6	0	0	+	+	+	0	0	+	0	+	0	+	+	0	0	+	0	0	+	0	+	0	+	0	+	+
rr	7	0	0	+	0	+	0	+	+	0	+	0	+	+	0	0	+	0	+	+	0	+	0	+	0	+	+
Rr	8	0	0	+	0	+	0	0	+	0	+	0	+	0	+	+	0	0	+	0	+	0	+	0	0	+	+
Rr	9	0	0	+	0	+	0	0	+	0	+	0	+	+	0	+	0	0	+	+	+	+	0	+	0	+	0
R1r	10	+	+	+	0	+	0	0	+	0	+	0	+	+	0	+	+	0	+	+	+	0	0	+	0	+	+
R0r	11	+	0	+	0	+	0	0	+	0	+	0	+	+	+	0	+	0	+	+	+	0	0	+	0	+	+
	Patient Cells																										

Figure 10–5. Antibody identification profile sheet: + indicates the antigen is present on the cell, 0 indicates the antigen is not present on the cell.

Limitations of antibody screening

- 26% of antibodies became undetectable over time.
- The screen cannot detect antibodies directed against low-prevalence antigens.
- Antibodies showing dosage may not be detected if none of the screen cells have homozygous expression of the target antigen.

Documentation is so important.

Auto control

- Serum and autologous red cells are tested.
- Is not the same as or equivalent to a DAT.
- *Phenotyping autologous Red Cells.*
- Transfusion in the past 3 month

TABLE 17-1. Some Causes of a Positive DAT Result

Autoantibodies to intrinsic red cell antigens
Hemolytic transfusion reactions
Hemolytic disease of the fetus and newborn
Drug-induced antibodies
Passively acquired alloantibodies (eg, from donor plasma, derivatives, or immunoglobulin)
Nonspecifically adsorbed proteins (eg, hypergammaglobulinemia, high-dose intravenous immune globulin, or modification of red cell membrane by some drugs)
Complement activation due to bacterial infection, autoantibodies, or alloantibodies
Antibodies produced by passenger lymphocytes (eg, in transplanted organs or hematopoietic components)

DAT = direct antiglobulin test

Interpretation of Results

- In what phase(s) did the reaction(s) occur? **Cold or warm?**

- Is the autologous control negative or positive?

  -No transfusion in past 3 months: **autoantibodies or antibodies to medications**.

  -Transfusion in past 3 months: alloantibodies coating the circulating donor RBCs.

- Did more than one screen cell sample react? **multiple or high prevalence or auto**?

- Is **hemolysis or mixed-field** agglutination present?

- Are the cells truly agglutinated, or is rouleaux present?

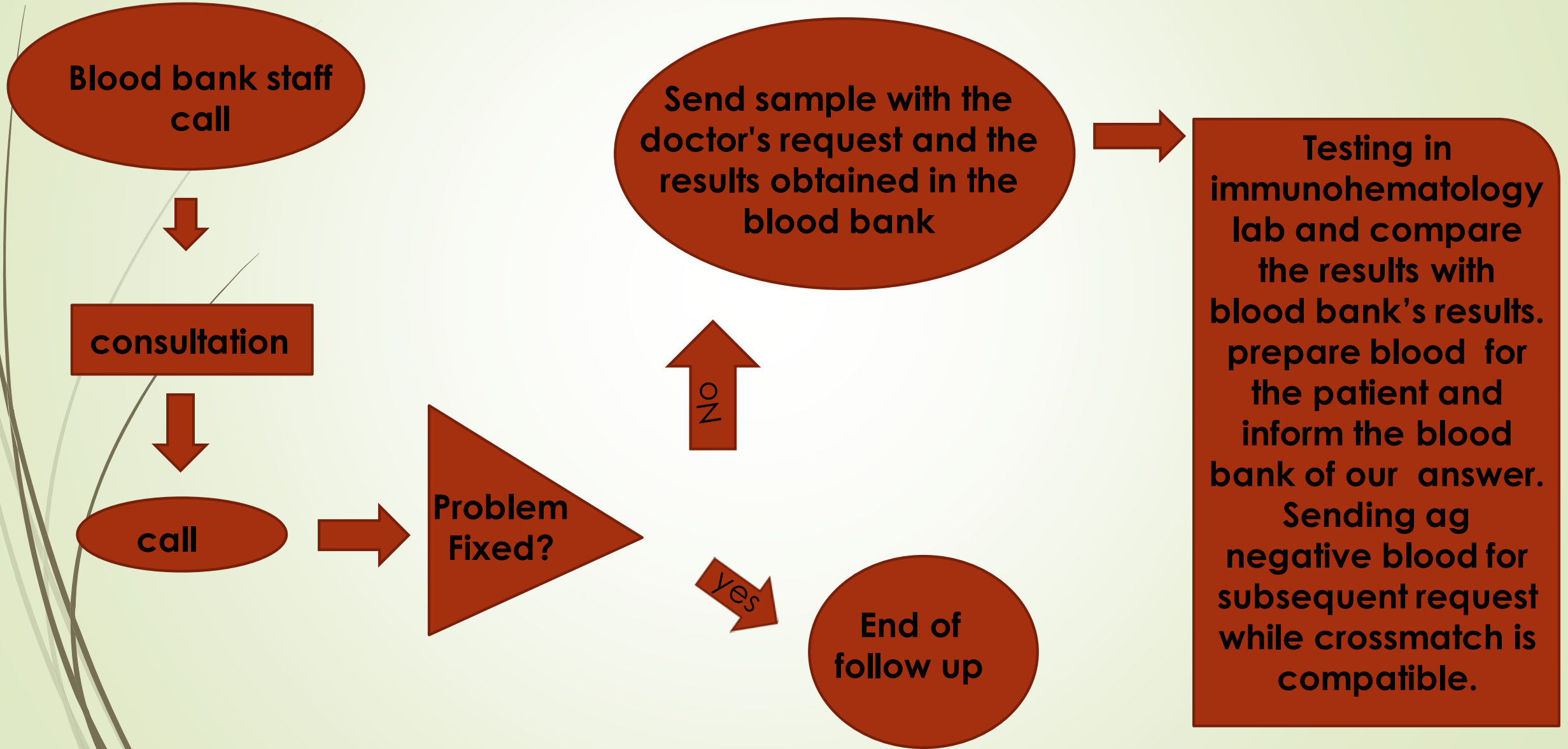
Interpretation of results

- Evaluation of antibody screen results
- The autologous control
- DAT
- Patient history (i.e., age, sex, race, diagnosis)
- Pregnancy
- Transfusion history
- Current medications
- Intravenous solutions
- IVIG and RhIG

➡Selecting blood for transfusion

- Finding antigen negative blood for patient (phenotype match is recommended).
- Performing cross match.
- Issue blood to hospital.
- Follow up patient.

The process of accepting samples from hospitals



When Rare Blood Is Needed?

- negative for high-prevalence antigens.
- negative for a combination of common antigens.

Incompatible blood??

- Autoantibody
- Consultation

  -Least incompatible for transfusion (with doctor's permission).

- Invivo crossmatch

  -25-50ml RBC transfusion

  -Check patient

  -After 30 min,take sample for serum hemolysis.

When rare blood is needed?

- IBTO

-Family members

- For infants with HDFN resulting from multiple antibodies or an antibody to a high-prevalence antigen, the mother (if she is ABO compatible) is often the logical donor.

Case presentation

Case presentation

- 29 years old girl with acute myeloid leukemia.
- After receiving several units of blood, severe hemolysis occurred.
- Hb of patient dropped till 3gr/dl.

ABO Discrepancy

Case presentation(Cont)

	Anti-A	Anti-B	Anti-A1	A_1 Cells	A_2 Cells	B Cells
	4+	0	4+	3+	0	4+
After prewarm	4+	0	NT	0	0	4+

Antibody screening

	Rh					Kell			Duffy		Kidd		Lewis		MNS				Luth		RT	37	AHG
	D	C	c	E	e	K	k	kp^b	Fy^a	Fy^b	Jk^a	Jk^b	Le^a	Le^b	M	N	S	s	Lu^a	Lu^b			
I	+	+	0	0	+	0	+	+	+	+	0	+	+	0	+	0	+	0	0	+	4+	4+	4+
II	+	0	+	+	0	0	+	+	+	0	+	+	0	+	+	+	0	+	0	+	3+	2+	3+
III	0	0	+	0	+	+	+	+	0	+	+	0	0	+	0	+	+	+	0	+	2+	2+	2+
AC																					0	0	2+

Antibody identification

	Rh					Kell		Duffy		Kidd		Lewis		MNS				Luth		RT	37	AHG
	D	C	c	E ★	e	K ★	k	Fy^a	Fy^b	Jk^a	Jk^b ★	Le^a	Le^b	M ★	N	S ★	s	Lu^a	Lu^b			
1	+	+	0	0	+	0	+	0	+	+	+	0	+	0	+	+	+	0	+	2+	3+	3+
2	+	+	0	0	+	0	+	+	0	+	0	+	0	0	+	0	+	0	+	0	0	0
3	+	0	+	+	0	0	+	0	+	0	+	+	0	+	+	0	+	0	+	1+	3+	3+
4	+	0	+	+	0	0	+	0	0	+	0	+	0	+	0	+	+	0	+	3+	3+	3+
5	+	+	+	+	+	+	0	0	+	+	0	0	+	+	+	0	+	0	+	2+	3+	4+
6	0	+	+	0	+	0	+	+	+	+	+	0	+	+	0	+	+	0	+	3+	3+	4+
7	0	0	+	0	+	0	+	0	+	+	0	0	+	0	+	0	+	0	+	0	0	0
8	0	0	+	0	+	+	+	+	+	0	+	+	0	0	+	+	0	0	+	1+	2+	3+
9	+	0	+	0	+	0	+	0	0	0	+	0	0	+	+	0	+	+	+	3+	2+	3+
10	0	+	+	+	+	0	+	+	+	+	+	+	+	+	0	+	+	0	+	3+	3+	4+
11	+	+	+	+	+	0	+	+	0	0	0	+	0	+	+	0	0	0	+	3+	3+	3+

Case presentation(Cont)

- Positive with all other selected cells.
- The patient's RBC phenotype was as follows:

  D+C+c+E-e+,K-,M-N+S-s+,JK(a+b-),Fy(a+b+).
- Antibodies of patient was Anti-E, Anti-M, Anti-S and Anti-JKb.

We can save patients if:

- ***Take antibody screening and Crossmatch serious.***
- Do the tests accurate and precise.
- Send us your complete results.
- **Contact us as soon as possible**.
- Close communication between doctors, blood bank staff and immunohematology lab.

You are never wrong to do the right thing !