Introduction to Antibody Identification

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Objectives

After this presentation the learner will be able to correctly:

1. State the clinical utility of antibody identification.
2. Describe the principle and procedure of the antibody identification tests.
3. Explain heterozygosity and homozygosity as they apply to antibody identification.
4. List allelic pairs in the following blood group systems: Rh, Duffy, Kidd, MNSs.
5. Given patient test results, work through the antibody identification process.

Antibody Screening and Identification

- Antibody screening is required:
  1. Any intended recipient of transfused blood.
  2. Prenatal testing for obstetric patients:
     evaluates risk of HDFN and candidacy for RhIg
  3. Donors of allogeneic blood and blood products and stem/progenitor cells.
- Further testing (Antibody ID) is required:
  1. If the screen is newly positive
  2. New alloantibody(ies) suspected

Antibody Identification

Methods for ABID

- Antibody identification (ABID) can be performed in the following media:
  - **Traditional tube method**
  - **Gel Technique**
  - **Solid Phase Technique**

Antibody exclusion

- An exclusion procedure can be undertaken through observation of antigens present on reagent cells with which patient sera did not react.
- This means the patient's antibodies are not likely directed against the antigens present on those cells.

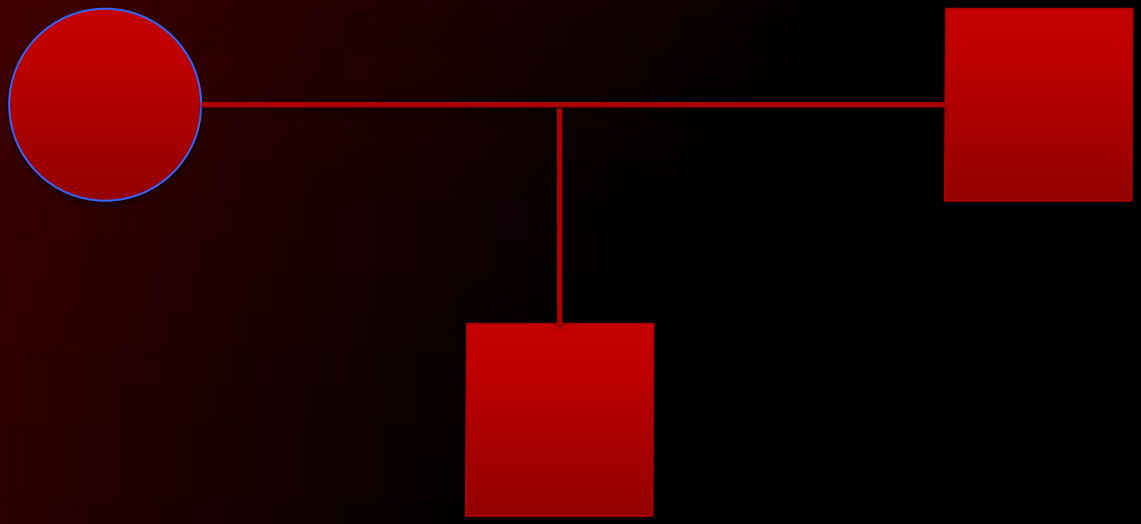
Procedure

- Go to the first panel cell with a negative reaction, “rule out” or exclude the specificities of antibodies directed against antigens present on the cell.
  - (Rule out when the antigen is positive and the patient did ***not*** react)
  - Some antibodies demonstrate *dosage*.

Dosage

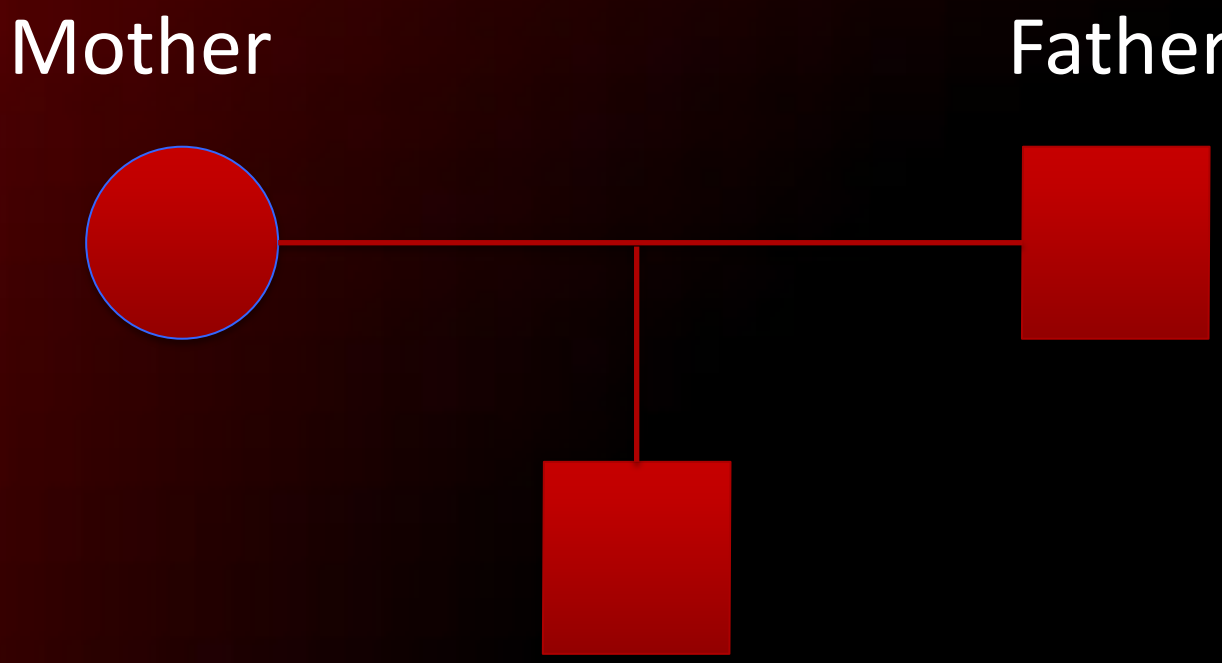
- Some antibodies may react so weakly with antigens with heterozygous expression, they might not be detected.
- For antibodies in the following blood groups, it may be prudent to rule out with panel cells that have a homozygous expression of antigen:
  - Rhesus (excluding D)
  - Kidd
  - Duffy
  - MNSs

Dosage



Heterozygous

Dosage

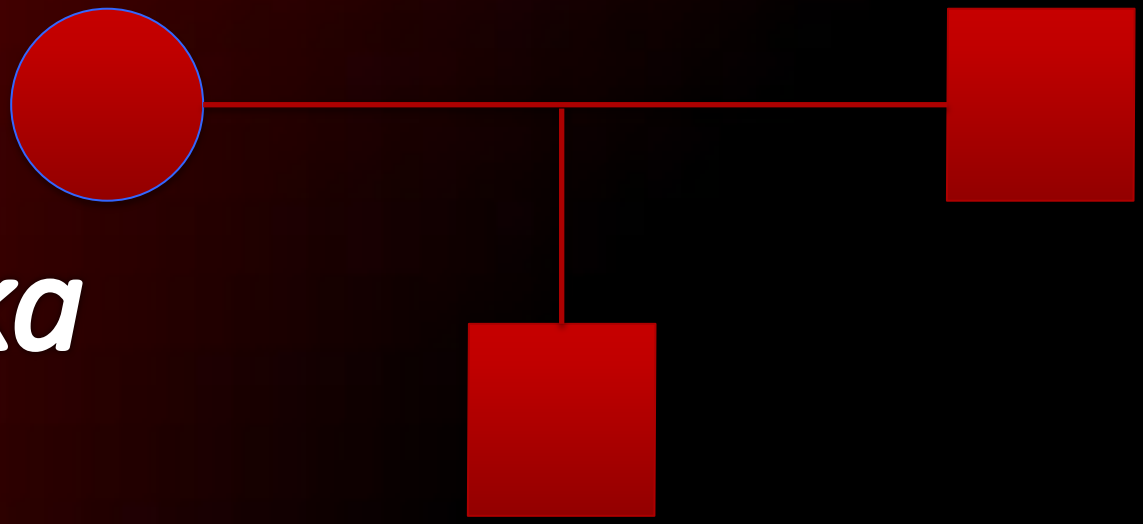


Heterozygous

Dosage

Mother

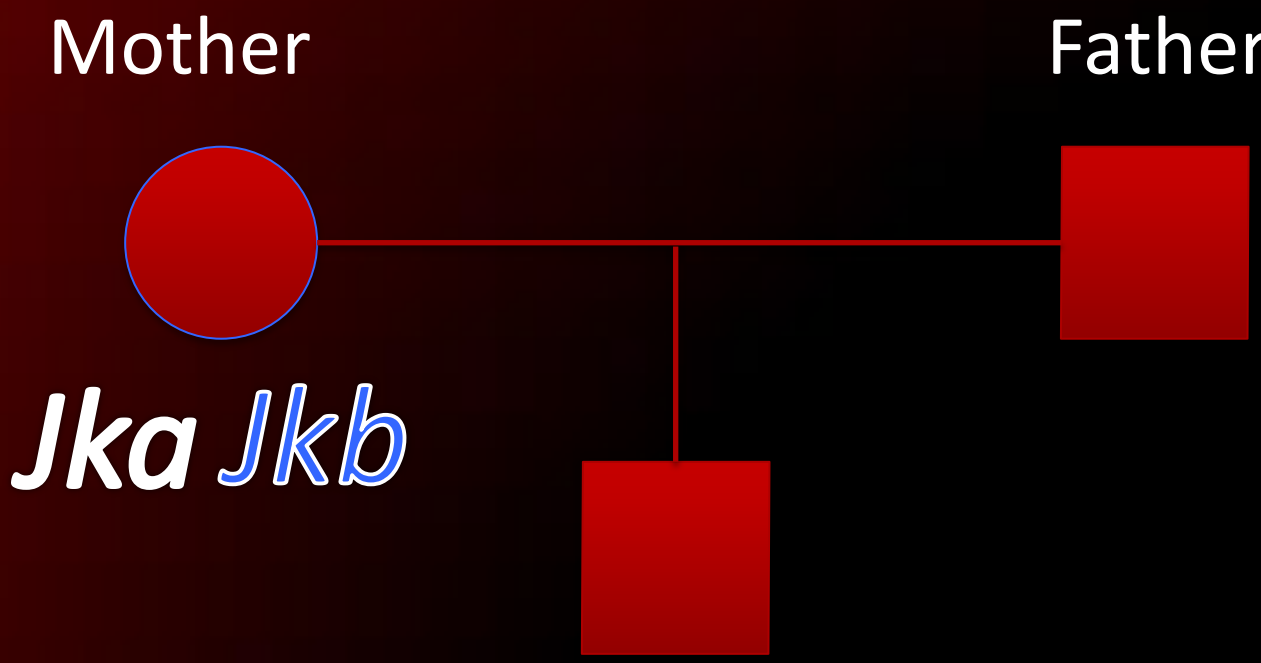
Father



Jka

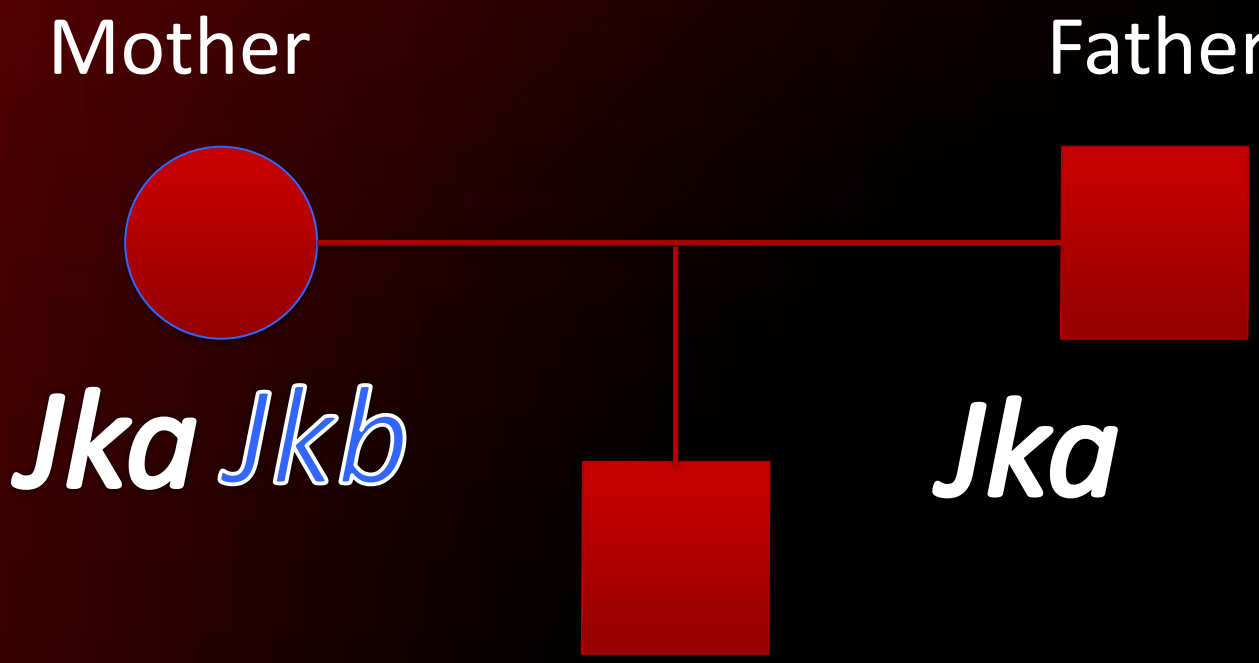
Heterozygous

Dosage



Heterozygous

Dosage



Heterozygous

Dosage

Heterozygous

Dosage

Jka

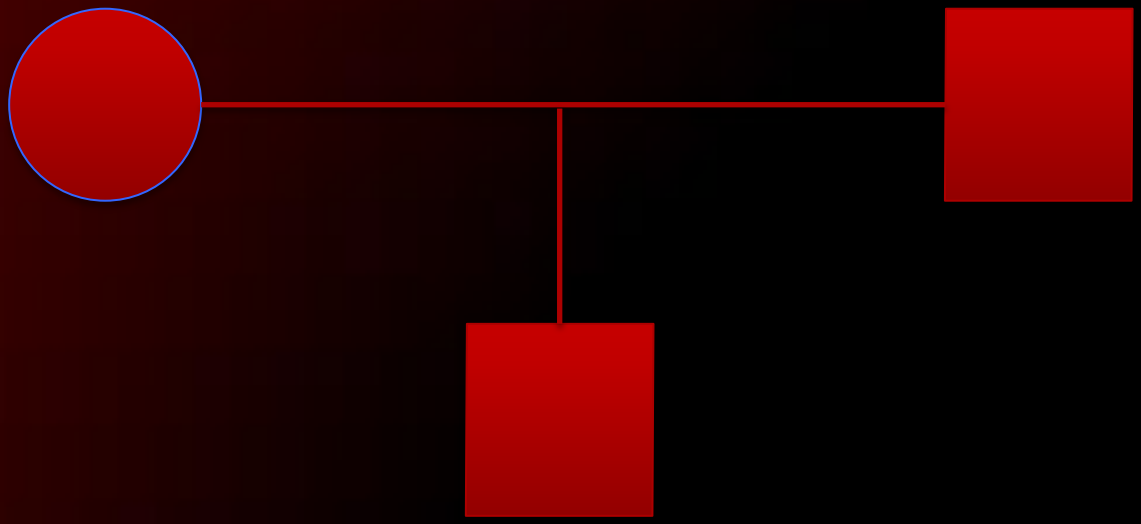
Heterozygous

Dosage

Jka ***Jkb***

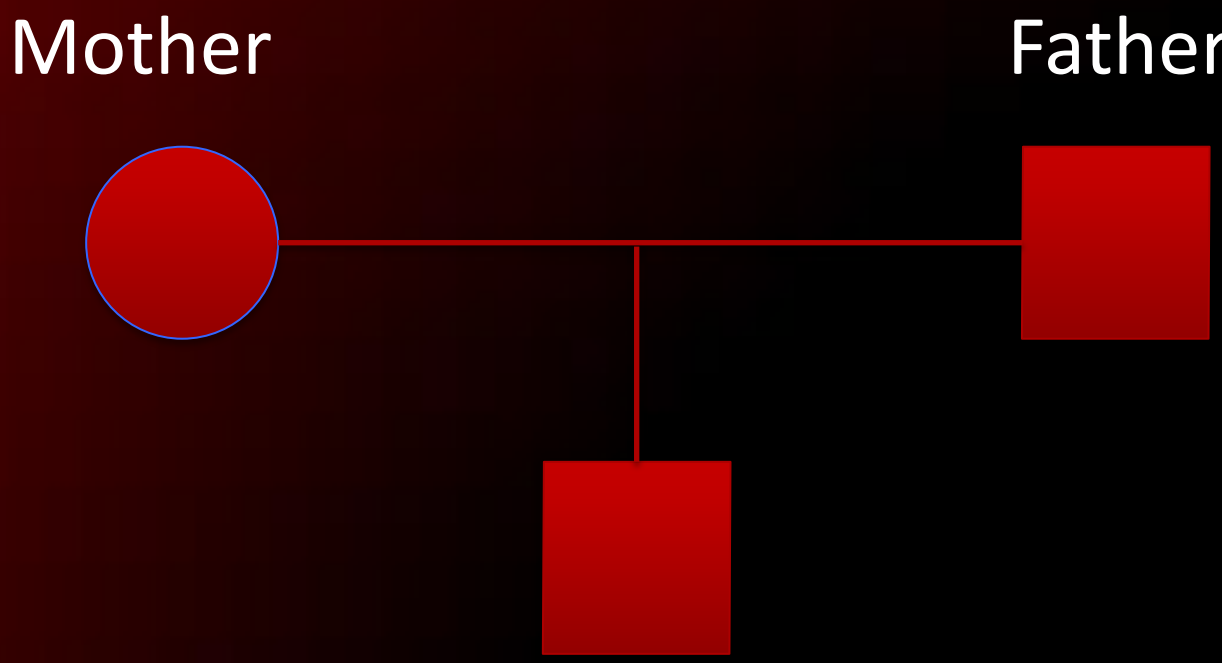
Heterozygous

Dosage



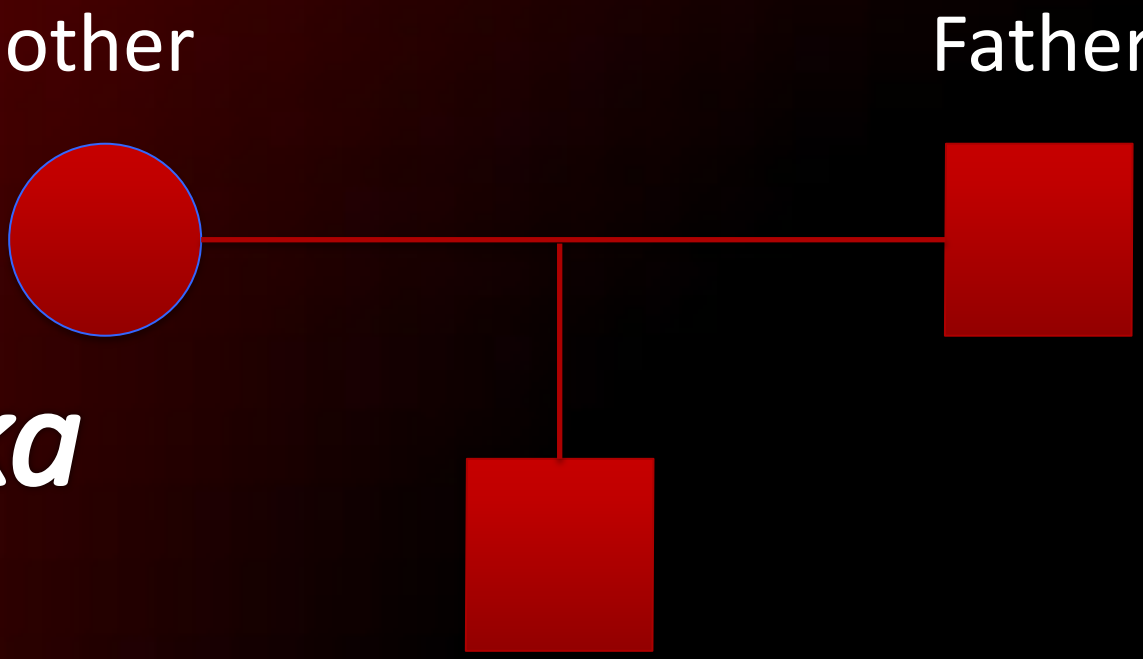
Homozygous

Dosage



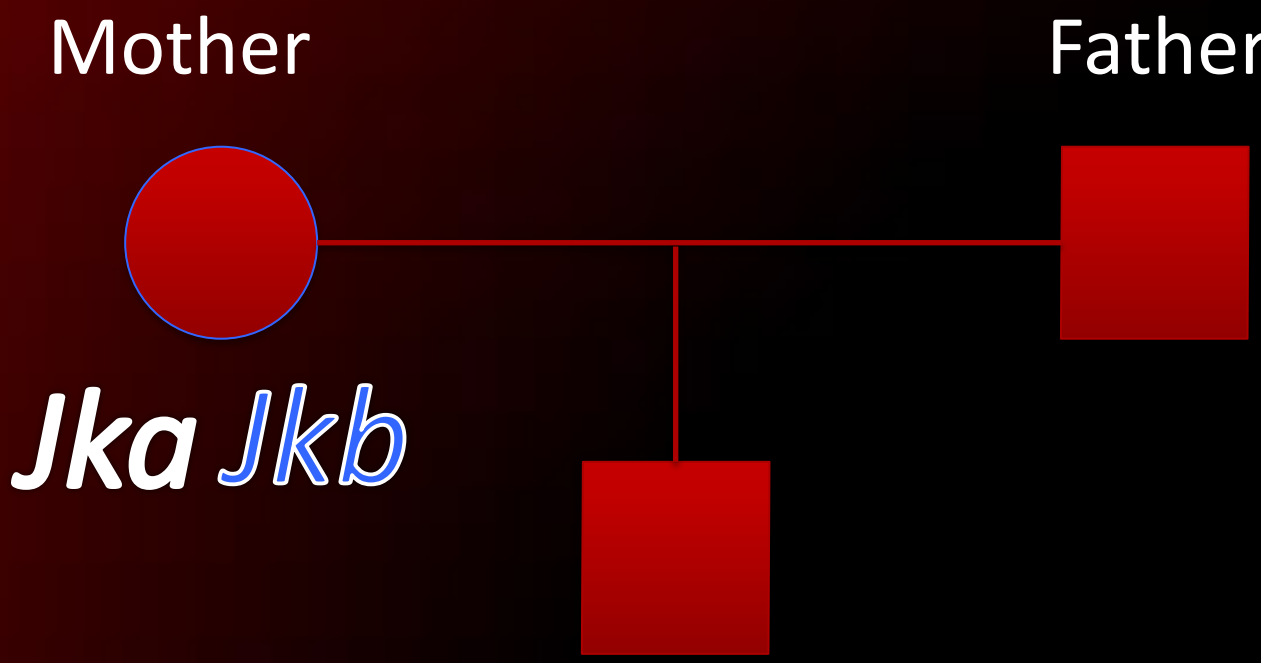
Homozygous

Dosage



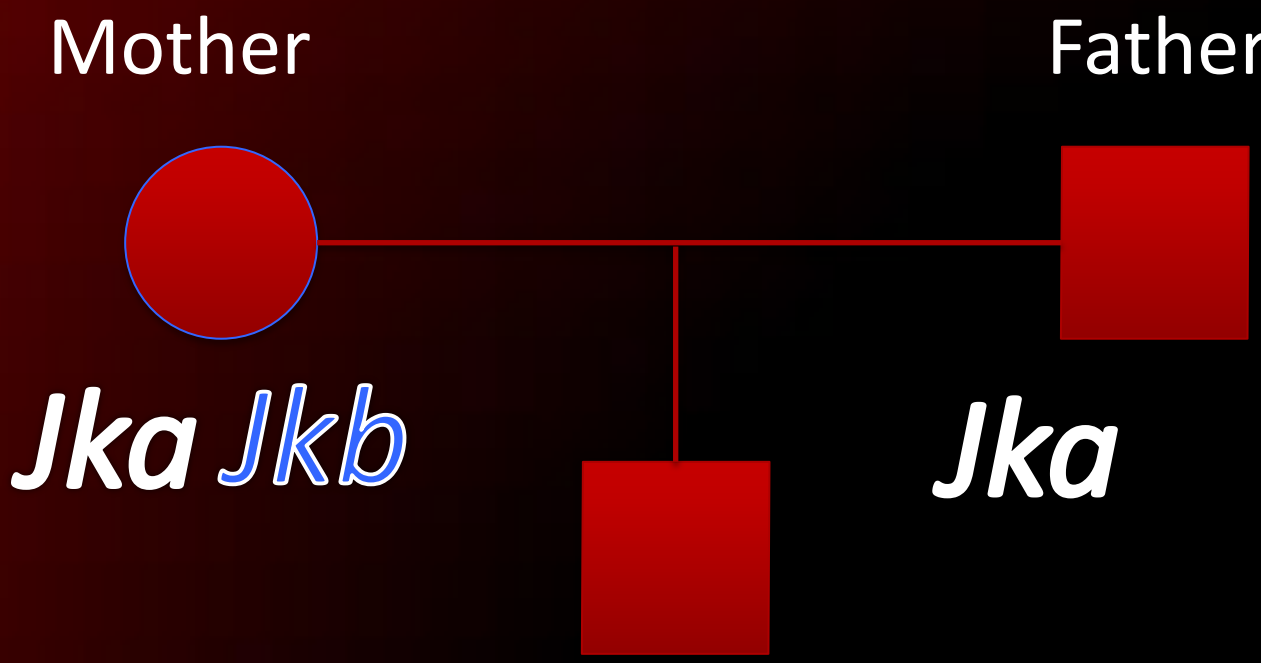
Homozygous

Dosage



Homozygous

Dosage



Homozygous

Dosage

Homozygous

Dosage

Jka

Homozygous

Dosage

Jka Jka

Homozygous

Dosage

- Anti-Jka may not react with a heterozygous “single dose” cell
- It may only react with a cell that has “double the dose” of Jka antigens

Allelic pairs

Rh System	**C, c**
	E, e
Duffy System	Fya, Fyb
Kidd System	Jka, Jkb
MNSs System	M, N
	S, s

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+			
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+			
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+			
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+			
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+			
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+			
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0			
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+			
AC																			

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1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

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1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
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7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
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1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
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7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
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2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
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7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
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1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	*0*	*2+*	
2	~~+~~	0	~~+~~	0	+	0	+	0	0	+	0	+	+	0	0	+	*0*	*0*	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	*0*	*2+*	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	*0*	*0*	✓
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7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	*0*	*0*	✓
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2	~~+~~	0	~~+~~	0	~~+~~	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
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7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
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2	~~+~~	0	~~+~~	0	~~+~~	0	~~+~~	0	0	~~+~~	0	+	+	0	0	+	0	0	✓
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2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
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2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
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7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
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2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
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6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
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1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	*0*	*2+*	
2	~~+~~	0	~~+~~	0	~~+~~	0	~~+~~	0	0	~~+~~	0	~~+~~	~~+~~	0	0	~~+~~	*0*	*0*	✓
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4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	*0*	*0*	✓
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6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	*0*	*0*	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	*0*	*0*	✓
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AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

The next step

- What alloantibody or alloantibodies have not been ruled out?

Anti-E

Anti-Fya

Which of the following is or are most likely?

Look closely at the pattern of reactivity.

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Confirmation steps

- Anti-E is the most likely antibody reacting
- However, we still have not ruled out anti-Fya
- The patient could have anti-Fya underlying the reactions of anti-E

We need to select another cell that is

E antigen negative, and Fy(a+b-)

HOMOZYGOUS for Duffy A

Selected Cell from a different panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fy b	Jka	Jkb	P1	M	N	S	s	37	AH G	CC
1	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	+			
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+			
3	+	0	+	0	+	+	+	+	0	+	0	+	0	+	+	+			
4	+	+	+	+	+	0	+	0	0	+	+	0	+	0	+	+			
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+			
6	0	0	+	+	+	0	+	0	0	+	0	0	+	0	0	+			
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0			
8	0	+	+	0	+	0	+	+	+	+	+	0	+	+	0	+			
AC																			

Selected Cell from a different panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	+			
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+			
3	+	0	+	0	+	+	+	+	0	+	0	+	0	+	+	+			
4	+	+	+	+	+	0	+	0	0	+	+	0	+	0	+	+			
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+			
6	0	0	+	+	+	0	+	0	0	+	0	0	+	0	0	+			
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0			
8	0	+	+	0	+	0	+	+	+	+	+	0	+	+	0	+			
AC																			

Selected Cell from a different panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	+			
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+			
3	+	0	+	0	+	+	+	+	0	+	0	+	0	+	+	+	*0*	*0*	✓
4	+	+	+	+	+	0	+	0	0	+	+	0	+	0	+	+			
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+			
6	0	0	+	+	+	0	+	0	0	+	0	0	+	0	0	+			
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0			
8	0	+	+	0	+	0	+	+	+	+	+	0	+	+	0	+			
AC																			

Selected Cell from a different panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	0	+	0	+	0	+	0	+	+	+	+	0	+			
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+			
3	+	0	+	0	+	+	+	+	0	+	0	+	0	+	+	+	*0*	*0*	✓
4	+	+	+	+	+	0	+	0	0	+	+	0	+	0	+	+			
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+			
6	0	0	+	+	+	0	+	0	0	+	0	0	+	0	0	+			
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0			
8	0	+	+	0	+	0	+	+	+	+	+	0	+	+	0	+			
AC																			

Rule of 3

- Criteria:
  - At least 3 panel cells with E antigen reacted (positive result) with patient's sample
  - At least 3 panel cells lacking E antigen did not react (negative result) with the patient's sample
- Does our example fulfill these criteria?

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Antibody Identification Panel

	Rh-Hr					Kell		Duffy		Kidd		P	MNSs				Results		
	D	C	c	E	e	K	k	Fya	Fyb	Jka	Jkb	P1	M	N	S	s	37	AHG	CC
1	+	0	+	+	+	0	+	0	0	+	+	+	+	+	0	+	0	2+	
2	+	0	+	0	+	0	+	0	0	+	0	+	+	0	0	+	0	0	✓
3	+	0	+	+	0	0	+	0	0	+	0	+	0	+	+	+	0	2+	
4	0	+	0	+	+	0	+	0	0	+	+	0	+	0	+	+	0	0	✓
5	0	0	+	+	+	0	+	0	0	0	+	+	0	+	0	+	0	2+	
6	0	0	+	0	+	0	+	0	0	+	0	0	+	0	0	+	0	0	✓
7	0	0	+	0	+	+	+	0	+	0	+	0	0	+	+	0	0	0	✓
8	+	+	+	+	+	0	+	+	+	+	+	0	+	+	0	+	0	2+	
AC																			

Yes!

- Positive for E, patient reacted:

  Cells 1, 3, 5, 8

- Negative for E, patient did not react:

  Cells 2, 6, 7

  Cell 4 can’t be used for this because it is E antigen positive

Rule of 3

- At least 3 true positives and 3 true negatives:

Following this rule gives us a *P* value of 0.05

95% chance that the antibody we have identified is correct.

Result

- Anti-E identified. All other clinically significant alloantibodies have been ruled out.
- Donor units lacking E antigen should appear crossmatch compatible through the indirect antiglobulin test (IAT).

In conclusion

- Rules for determining how antibody identification is performed are determined by the facility.
  - ✓Rule of 2?
  - ✓2 in 3 out?
  - ✓Heterozygous ok if 2
  - ✓Etc.

In conclusion

- Some patient antibodies may be so weak, they are only detected with a homozygous cell.
- Antibodies may behave differently in different media:
  - Solid phase?
  - Gel?
  - Tube technique:
    - PeG?
    - LISS?

In conclusion

- With multiple alloantibodies, it is important to prove them *independently* of each other.
- The process of antibody identification can take several hours in order to determine the specificity of the alloantibody(ies).

Antibody Identification Example 1:

Cold Reactive Alloantibody

Antibody Identification Example 2:

Multiple Warm Reactive Alloantibodies

Antibody Identification Example 3:

Alloantibody demonstrating dosage

Thank you!