

# Red Cell Immunohaematology

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# What is RCI?

- National support for Transfusion Laboratories
- RCI labs located in Blood Centres in Birmingham, Bristol (Filton), London (Collindale, Tooting), Liverpool and Sheffield
- Liverpool hosts the NFFB and reagents
- Filton hosts the IBGRL
  
- Majority of blood transfusions can be facilitated by hospitals, BUT..



## BCSH Guidelines 2012..

- If there is any doubt concerning the identity of any antibodies present, or the ability to exclude clinically significant antibodies, a sample should be sent to a red cell reference laboratory.
- Laboratories that are not registered for antibody investigation in an accredited external quality assurance scheme should refer samples from all patients that have given positive results in the antibody screen to a laboratory that is registered for antibody identification.

## BCSH Guidelines 2012..

- If a patient is known to have (ever) formed a red cell alloantibody, each new sample must be fully tested to exclude the presence of further alloantibodies.
- When one antibody specificity is detected it is essential that the presence or absence of additional clinically significant alloantibodies is established.

## Why Refer to RCI?

- Rare/ Anomalous ABO/ D blood grouping
- Antibody Confirmation/ Identification
- Complex mixtures of antibodies
- Antenatal Investigations;
  - Quantification and titration
  - FMH Investigation
  - Provision of suitable blood for delivery/IUT
- AIHAs/ DAT positive patients
- Suspected Haemolytic Transfusion Reactions
- Advice!
- Panic?



Alternative temperatures

DAT

Techniques

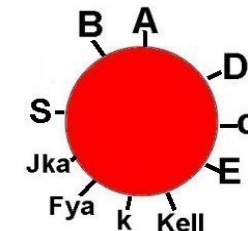
Auto/Alloadsorption and Elution

Phenotype/Genotype

Enzyme treatment of panel cells

Neutralisation

Get off me!!!



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Indirect Agglutination Technique (IAT)

Column (gel)

LISS Tube

Fresh/frozen rare cells

Additional panels; Panel 2, R1R1 and R2R2

- Via **NHSBT Liverpool** and in liaison with the **International Blood Group Reference Laboratory (IBGRL)** RCI have access to additional reagents that may not be available to Hospital Labs;
  - Reference antibody identification panels Rare cells to confirm or exclude specificity
  - Rare antisera for phenotyping
  - National Frozen Cell Bank
  - National / international rare cell exchange
  - WHO International Rare Cell Donor Panel

## BCSH Guidelines 2012..

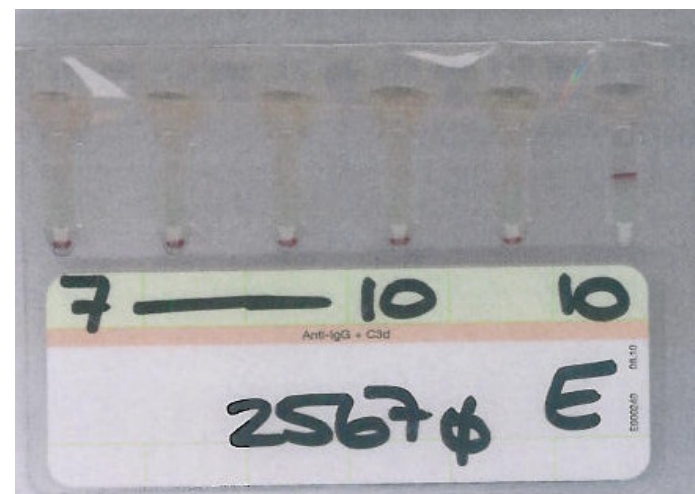
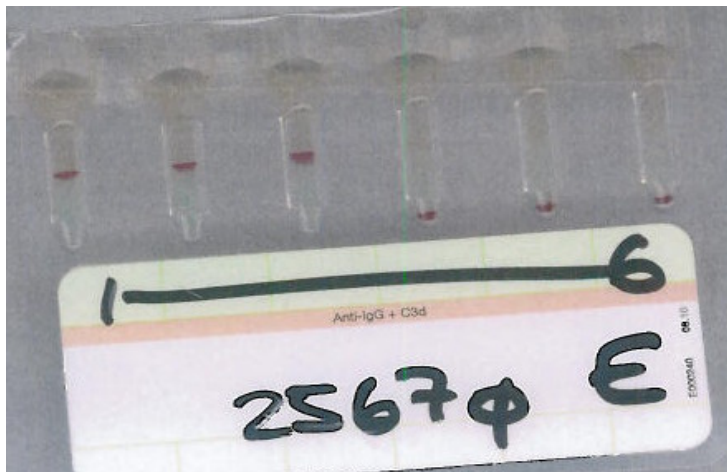
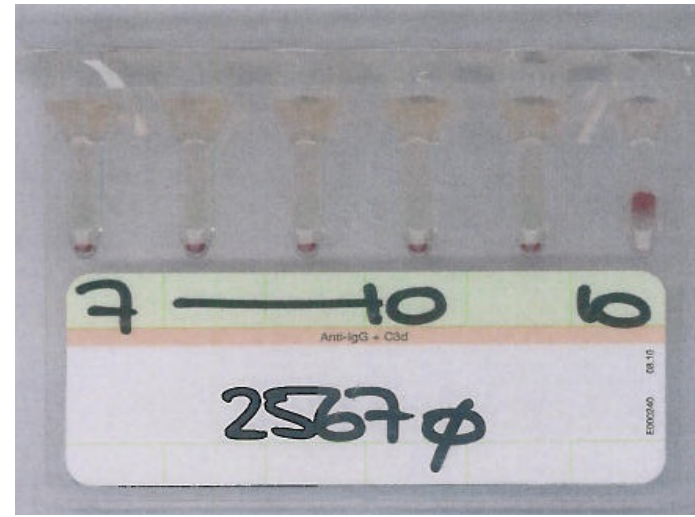
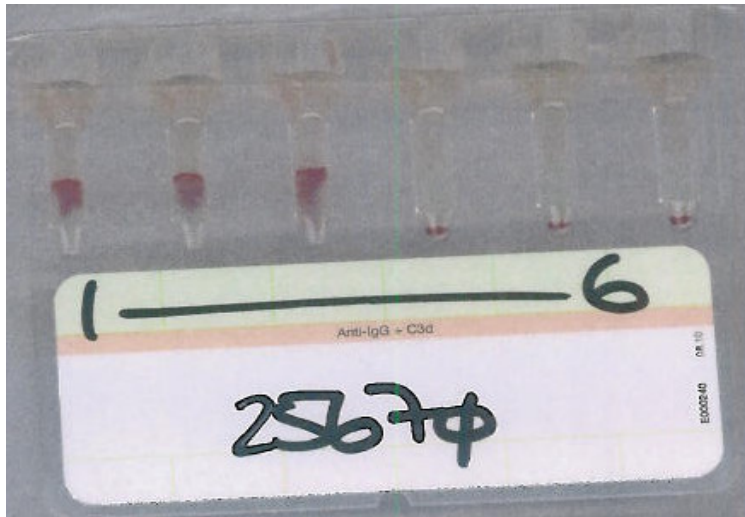
- Antibody specificity should only be assigned when the plasma is reactive with at least 2 examples of reagent red cells expressing the antigen and non-reactive with at least 2 examples of reagent red cells lacking the antigen.
- When one antibody specificity has been identified, it is essential that the presence or absence of additional clinically significant antibodies should be established. This can be demonstrated by choosing reagent red cells that are negative for the recognised specificity but positive for other antigens to which clinically significant antibodies may arise.



## BCSH Guidelines 2012..

- Failure to recognise all of the antibody specificities within a sample can lead to a haemolytic transfusion reaction. Specificities should be excluded using red cells having **homozygous expression** of the relevant antigen. A **single example** only of each phenotype is sufficient for exclusion.

# Example Cases



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NHSBT Reagents Panel 1

Antibody Investigation Worksheet

Sample Name		Requestor		Database Ref No.		Tested by															
Date of Birth		Hosp no		Sample No.		Date Tested															
Product		Lot No.		Product		Lot No.															
Panel in Alsevers		R144 3288		Panel in CellStab		R143 3288															
Panel Papainised in Alsevers		R154 3288		Panel Papainised in CellStab		R153 3288															
				Panel in CellMedia		R163 3288															
				Panel Papainised in CellMedia		R173 3288															
						EXPIRY DATE: 2014.01.09															
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	JK <sup>a</sup>	JK <sup>b</sup>	Other	IAT	ENR		
1	R <sub>1</sub> <sup>w</sup> R <sub>1</sub>	0	+	0	+	5	0	+	+	0	0	+	0	+	0	+	MAR weak	S	S		
2	R <sub>1</sub> R <sub>1</sub>	+	+	+	0	0	0	0	+	0	+	0	+	0	+	0		S	S		
3	R <sub>2</sub> R <sub>2</sub>	0	+	0	+	3	0	0	+	0	+	0	0	+	+	0		S	S		
4	r'r	+	0	+	0	3	0	0	+	0	0	+	0	+	+	0	Cob+	0	0		
5	r''r	+	0	+	0	0	0	0	+	0	0	+	+	0	0	+		0	0		
6	rr	+	0	0	+	0	0	+	0	0	0	+	0	+	+	0		0	0		
7	rr	+	0	+	0	0	0	+	+	0	0	0	w	0	+	0		0	0		
8	rr	0	+	0	+	2	0	0	+	+	0	+	+	0	+	0		0	0		
9	rr	0	+	+	0	3	0	0	+	0	0	+	+	0	0	+		0	0		
10	rr	+	0	+	0	2	+	0	+	0	+	0	0	+	0	+	Cob+	0	0		
Auto																					
Antibody Titre																		Group		Pheno	
Dilution																		Cell Id		Conclusion	
Anti-																					
Archive																					
Anti																					
Archive																					
DAT Batch No																		Entered into Database by:.....		Authorised by:.....	
PS		IgG		IgA		IgM		C3c		C3d		Ctl									
Reagent																					
Batch No's																					

Pipette batch No's

(Forma Version 01/04)

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Have a go yourself!

NHSBT Reagents Panel 1 Antibody Investigation Worksheet

Sample Name		Requestor		Database Ref No.		Tested by																	
Date of Birth		Hosp no		Sample No.		Date Tested																	
Product		Lot No.		Product		Lot No.																	
Panel in Aisevers		R144 3312		Panel in CellStab		R143 3312																	
Panel Papanised in Aisevers		R154 3312		Panel Papanised in CellStab		R163 3312																	
				Panel Papanised in CellMedia		R173 3312																	
						EXPIRY DATE: 2014.12.11																	
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	Jk <sup>a</sup>	Jk <sup>b</sup>	Other	IAT	EN2				
1	R <sub>1</sub> <sup>w</sup> R <sub>1</sub>	0	+	0	+	3	0	0	+	0	0	+	+	0	0	+		3	0				
2	R <sub>1</sub> R <sub>1</sub>	+	0	+	0	2	0	+	+	0	0	+	0	+	+	0		0	0				
3	R <sub>2</sub> R <sub>2</sub>	0	+	0	+	0	0	0	+	0	0	+	0	+	0	+		3	5				
4	r'r	0	+	0	+	5	0	0	+	0	0	0	+	+	0	+		3	5				
5	r'r	+	0	+	0	2	0	0	+	0	+	0	+	0	+	0	Rg-	3	5				
6	rr	+	+	0	+	2	0	+	0	0	0	+	0	+	+	0	Chido-	3	5				
7	rr	0	+	0	+	3	0	+	+	0	+	0	+	0	0	+		3	5				
8	rr	+	0	0	+	0	0	0	+	+	0	+	0	+	0	+		3	5				
9	rr	0	+	+	0	3	0	0	+	0	0	+	+	0	0	+		3	5				
10	rr	0	+	0	+	3	+	0	+	0	0	0	+	0	+	0		3	5				
Auto																		0	0				
Antibody Titre										Group				Pheno									
Dilution:										A RhD Pos				C <sup>+</sup> E <sup>-</sup> E <sup>-</sup> K <sup>+</sup> Fy <sup>a</sup> (a-b <sup>-</sup> )Jk <sup>(a+b<sup>-</sup>)</sup>									
Anti:										Conclusion													
Archive										PATIENT 1 : ANTENATAL 28 WEEK SAMPLE													
Anti:										Entered into													
Archive										Database by:..... Authorised by.....													
DAT Batch No																							
PS		IgG		IgA		IgM		C3c		C3d		Ctl											
Reagent																							
Batch No's																							
Pipette batch No's																							

**NBS Reagents**

**Reference Panel 1 Worksheet**

Sample Name		Requestor		Database Ref No.		Tested by												
Date of Birth		Hosp no		Sample No.		Date Tested												
Product			Lot No.			EXPIRY DATE : 2014.12.25												
Reference Panel 1 in Alsevers			R201 3178															
Reference Panel 1 in Cellstab			R202 3178															
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	Jk <sup>a</sup>	Jk <sup>b</sup>	Other	IAT
1	R1wR1	+	0	+	0	3	+	0	+	0	+	0	0	+	+	0		0
2	R1wR1	0	+	0	+	4	0	0	+	0	0	+	+	0	0	+		3
3	R1RZ	+	+	+	0	0	0	0	+	0	0	+	+	0	+	0		3
4	R1RZ	0	+	0	+	0	0	0	+	0	0	+	0	+	0	+		0
5	Ror	0	+	0	+	4	0	0	+	0	0	0	0	0	+	0	V+ VS+	3
6	R1r'	0	+	0	+	4	0	+	0	0	0	+	+	0	0	+		3
7	R1R1	+	0	+	0	3	0	+	+	0	0	+	0	+	+	0		0
8	R1R1	0	+	0	+	0	0	0	+	+	+	0	+	0	+	0		3
9	R1R1	+	0	0	+	2	+	0	+	0	+	0	0	+	0	+		0
10	R1R1	0	+	+	0	3	0	0	+	0	0	+	0	+	0	+		0
Auto																		
Antibody Titre							Group			Pheno								
Dilution:							Cell Id											
Anti-																		
Archive										Conclusion								
Anti																		
Archive																		
DAT Batch No										Entered into Database by.....Authorised by.....								
PS		IgG		IgA		IgM		C3c		C3d		Ctl						
Reagent																		
Batch No's																		

NHSBT Reagents **Panel 1** **Antibody Investigation Worksheet**

Sample Name		Requestor		Database Ref No.		Tested by																	
Date of Birth		Hosp no		Sample No.		Date Tested																	
Product		Lot No.		Product		Lot No.																	
Panel in Alsevers		R144 3312		Panel in CellStab		R143 3312																	
Panel Papanised in Alsevers		R154 3312		Panel Papanised in CellStab		R153 3312																	
Product		Lot No.		Product		Lot No.																	
Panel in CellMedia		R163 3312		Panel in LISP		R146 3312																	
Panel Papanised in CellMedia		R173 3312		EXPIRY DATE: 2014.12.11																			
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	JK <sup>a</sup>	JK <sup>b</sup>	Other	IAT	ENZ				
1	R <sub>1</sub> <sup>w</sup> R <sub>1</sub>	0	+	0	+	3	0	0	+	0	0	+	+	0	0	+		0	0				
2	R <sub>1</sub> R <sub>1</sub>	+	0	+	0	2	0	+	+	0	0	+	0	+	+	0		0	0				
3	R <sub>2</sub> R <sub>2</sub>	0	+	0	+	0	0	0	+	0	0	+	0	+	0	+		0	0				
4	r'r	0	+	0	+	5	0	0	+	0	0	0	+	+	0	+		0	0				
5	r''r	+	0	+	0	2	0	0	+	0	+	0	+	0	+	0	Rg-	0	0				
6	rr	+	+	0	+	2	0	+	0	0	0	+	0	+	+	0	Chido-	0	0				
7	rr	0	+	0	+	3	0	+	+	0	+	0	+	0	0	+		0	0				
8	rr	+	0	0	+	0	0	0	+	+	0	+	0	+	0	+		WK	1				
9	rr	0	+	+	0	3	0	0	+	0	0	+	+	0	0	+		0	0				
10	rr	0	+	0	+	3	+	0	+	0	0	0	+	0	+	0		0	0				
Auto																		0	0				
	ORIRI	0	+	0	+	0	0	0	+	+	0	+	+	+	0	+		WK	1				
Antibody Titre																	Group			Pheno			
Dilution:																	ORND Pos			C <sup>+</sup> c <sup>+</sup> E <sup>+</sup> e <sup>+</sup> K <sup>-</sup>			
Anti-																	Conclusion						
Archive																	PATIENT 2: SS preoperative patient, requires 20xm.						
Anti																	Entered into						
Archive																	Database by:..... Authorised by:.....						
DAT Batch No																							
PS		IgG		IgA		IgM		C3c		C3d		Ctl											
Reagent																							



NHSBT Reagents Panel 1

Antibody Investigation Worksheet

Sample Name		Requestor		Database Ref No.		Tested by															
Date of Birth		Hosp no		Sample No.		Date Tested															
Product		Lot No.		Product		Lot No.															
Panel in Alsevers		R144 3312		Panel in CellStab		R143 3312															
Panel Papanised in Alsevers		R154 3312		Panel Papanised in CellStab		R153 3312															
Product		Lot No.		Product		Lot No.															
Panel in CellMedia		R163 3312		Panel in LISP		R146 3312															
Panel Papanised in CellMedia		R173 3312		EXPIRY DATE: 2014.12.11																	
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	Jk <sup>a</sup>	Jk <sup>b</sup>	Other	IAT	EN2	TUBE IAT	ELITE
1	R <sub>1</sub> <sup>w</sup> R <sub>1</sub>	0	+	0	+	3	0	0	+	0	0	+	+	0	0	+		0	0	0	0
2	R <sub>1</sub> R <sub>1</sub>	+	0	+	0	2	0	+	+	0	0	+	0	+	+	0		0	0	0	WK
3	R <sub>2</sub> R <sub>2</sub>	0	+	0	+	0	0	0	+	0	0	+	0	+	0	+		0	0	0	0
4	r'r	0	+	0	+	5	0	0	+	0	0	0	+	+	0	+		0	0	0	0
5	r'r	+	0	+	0	2	0	0	+	0	+	0	+	0	+	0	Rg-	0	0	0	1
6	rr	+	+	0	+	2	0	+	0	0	0	+	0	+	+	0	Chido-	0	0	0	WK
7	rr	0	+	0	+	3	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	3	0	0	+	0	0	+	+	0	0	+		0	0	0	0
10	rr	0	+	0	+	3	+	0	+	0	0	0	+	0	+	0		0	0	0	WK
Auto																		5	0	0	
																		xm 1	0		
																		xm 2	0		
																		xm 3	1		
																		xm 4	WK		
Antibody Titre						Group						Pheno									
Dilution:						ORhD neg						C <sub>0</sub> D <sup>+</sup> E <sup>-</sup> e <sup>+</sup> K <sup>-</sup>									
Anti-						Conclusion						Transfused - unable to determine									
Archive						PATIENT 3: 80 year old female, transfused 14 days															
Anti						Previously. NEG SCREEN PRIOR TO ISSUE OF BLOOD.															
Archive						Entered into						Authorised by.....									
DAT Batch No						Database by.....															
PS		IgG		IgA		IgM		C3c		C3d		Ctl									
/		SMF		0		0		0		0		0									
Reagent																					
Batch																					

NHSBT Reagents Panel 1 Antibody Investigation Worksheet

Sample Name		Requestor		Database Ref No.		Tested by																	
Date of Birth		Hosp no		Sample No.		Date Tested																	
Product		Lot No.		Product		Lot No.																	
Panel in Alsevers		R144 3312		Panel in CellStab		R143 3312																	
Panel Papanised in Alsevers		R154 3312		Panel Papanised in CellStab		R153 3312																	
				Panel Papanised in CellMedia		R163 3312																	
				Panel Papanised in CellMedia		R173 3312																	
						EXPIRY DATE: 2014.12.11																	
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	JK <sup>a</sup>	JK <sup>b</sup>	Other	IAT	EN2	Prvwn TUBE IAT	-33C	SAL QTC	
1	R <sub>1</sub> <sup>w</sup> R <sub>1</sub>	0	+	0	+	3	0	0	+	0	0	+	+	0	0	+			0	0	0		0
2	R <sub>1</sub> R <sub>1</sub>	+	0	+	0	2	0	+	+	0	0	+	0	+	+	0			3	0	0		3
3	R <sub>2</sub> R <sub>2</sub>	0	+	0	+	0	0	0	+	0	0	+	0	+	0	+			0	0	0		0
4	r'r	0	+	0	+	5	0	0	+	0	0	0	+	+	0	+			0	0	0		0
5	r''r	+	0	+	0	2	0	0	+	0	+	0	+	0	+	0	Rg-		3	0	0		3
6	rr	+	+	0	+	2	0	+	0	0	0	+	0	+	+	0	Chido-		1	0	0		2
7	rr	0	+	0	+	3	0	+	+	0	+	0	+	0	0	+			0	0	0		0
8	rr	+	0	0	+	0	0	0	+	+	0	+	0	+	0	+			3	0	0		3
9	rr	0	+	+	0	3	0	0	+	0	0	+	+	0	0	+			0	0	0		0
10	rr	0	+	0	+	3	+	0	+	0	0	0	+	0	+	0			0	0	0		0
Auto																							
Antibody Titre																	Group		Pheno				
Dilution																	BRND POS		C <sup>+</sup> E <sup>+</sup> E <sup>-</sup> K <sup>-</sup>				
Anti-																	Conclusion						
Archive																	PATIENT 4: 45 YR OLD MALE SEEN WITH BLOOD GROUPING DISCREPANCY (SEE ATTACHED)						
Anti																	Entered into Database by:.....						
Archive																	Authorised by:.....						
DAT Batch No																							
PS		IgG		IgA		IgM		C3c		C3d		Ctl											
Reagent																							
Batch No's																							

Anti-A	Anti-B	Anti-D <sub>i</sub>	ANTI D <sub>2</sub>	A1 cells	B cells
0	5	5	5	5	3

Controls	Arr	5	0	0	0
	Brr	0	5	0	0
	OR1r	0	0	5	5

NHSBT Reagents **Panel 1** **Antibody Investigation Worksheet**

Sample Name		Requestor		Database Ref No.		Tested by																		
Date of Birth		Hosp no		Sample No.		Date Tested																		
Product		Lot No.		Product		Lot No.																		
Panel in Alsevers		R144 3312		Panel in CellStab		R143 3312																		
Panel Papanised in Alsevers		R154 3312		Panel Papanised in CellStab		R153 3312																		
Product		Lot No.		Product		Lot No.																		
Panel in CellMedia		R163 3312		Panel in LISP		R146 3312																		
Panel Papanised in CellMedia		R173 3312		EXPIRY DATE: 2014.12.11																				
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	Jk <sup>a</sup>	Jk <sup>b</sup>	Other	IAT	EN2					
1	R <sub>1</sub> <sup>w</sup> R <sub>1</sub>	0	+	0	+	3	0	0	+	0	0	+	+	0	0	+			3	5				
2	R <sub>1</sub> R <sub>1</sub>	+	0	+	0	2	0	+	+	0	0	+	0	+	+	0			3	5				
3	R <sub>2</sub> R <sub>2</sub>	0	+	0	+	0	0	0	+	0	0	+	0	+	0	+			3	5				
4	r'r	0	+	0	+	5	0	0	+	0	0	0	+	+	0	+			3	5				
5	r'r	+	0	+	0	2	0	0	+	0	+	0	+	0	+	0	Rg-		3	5				
6	rr	+	+	0	+	2	0	+	0	0	0	+	0	+	+	0	Chido-		3	5				
7	rr	0	+	0	+	3	0	+	+	0	+	0	+	0	0	+			3	5				
8	rr	+	0	0	+	0	0	0	+	+	0	+	0	+	0	+			3	5				
9	rr	0	+	+	0	3	0	0	+	0	0	+	+	0	0	+			3	5				
10	rr	0	+	0	+	3	+	0	+	0	0	0	+	0	+	0			3	5				
Auto																			0	0				
Antibody Titre																	Group			Pheno				
Dilution:																	ORND POS			C <sup>-</sup> c <sup>+</sup> E <sup>-</sup> e <sup>+</sup> K <sup>-</sup> S <sup>-</sup> s <sup>-</sup> Fy(a-b <sup>-</sup> )				
Anti-																	Conclusion							
Archive																	PATIENTS: 55 YEAR OLD. FROM BLACK AFRICAN BACKGROUND							
Anti																	Entered into Database by:..... Authorised by:.....							
Archive																								
DAT Batch No																								
PS		IgG		IgA		IgM		C3c		C3d		Ctl												
Reagent																								
Batch No's																								

NHSBT Reagents Panel 1

Antibody Investigation Worksheet

Sample Name		Requestor		Database Ref No.		Tested by															
Date of Birth		Hosp no		Sample No.		Date Tested															
Product		Lot No.		Product		Lot No.															
Panel in Alsevers		R144 3312		Panel in CellStab		R143 3312															
Panel Papainised in Alsevers		R154 3312		Panel Papainised in CellStab		R153 3312															
Product		Lot No.		Product		Lot No.															
Panel in CellMedia		R163 3312		Panel in LISP		R146 3312															
Panel Papanised in CellMedia		R173 3312		EXPIRY DATE: 2014.12.11																	
	Rh	M	N	S	s	P1	Lu <sup>a</sup>	K	k	Kp <sup>a</sup>	Le <sup>a</sup>	Le <sup>b</sup>	Fy <sup>a</sup>	Fy <sup>b</sup>	JK <sup>a</sup>	JK <sup>b</sup>	Other	IAT	ENZ	ISI INHIBIT	PBS ICI CONTROL
1	R <sub>1</sub> <sup>w</sup> R <sub>1</sub>	0	+	0	+	3	0	0	+	0	0	+	+	0	0	+		3	0	0	2
2	R <sub>1</sub> R <sub>1</sub>	+	0	+	0	2	0	+	+	0	0	+	0	+	+	0		2	0	0	2
3	R <sub>2</sub> R <sub>2</sub>	0	+	0	+	0	0	0	+	0	0	+	0	+	0	+		2	0	0	2
4	r'r	0	+	0	+	5	0	0	+	0	0	0	+	+	0	+		3	0	0	3
5	r''r	+	0	+	0	2	0	0	+	0	+	0	+	0	+	0	Rg-	2	0	0	2
6	rr	+	+	0	+	2	0	+	0	0	0	+	0	+	+	0	Chido-	0	0	0	0
7	rr	0	+	0	+	3	0	+	+	0	+	0	+	0	0	+		2	0	0	2
8	rr	+	0	0	+	0	0	0	+	+	0	+	0	+	0	+		3	0	0	3
9	rr	0	+	+	0	3	0	0	+	0	0	+	+	0	0	+		3	0	0	2
10	rr	0	+	0	+	3	+	0	+	0	0	0	+	0	+	0		2	0	0	2
Auto																		0	0		
Antibody Titre												Group				Pheno					
Dilution:												ARhD neg				C <sup>-</sup> c <sup>+</sup> E <sup>-</sup> e <sup>+</sup> K <sup>-</sup> k <sup>+</sup>					
Anti-												Conclusion									
Archive												PATIENT 6: 45 YR OLD FEMALE POST OPERATIVE									
Anti												Entered into									
Archive												Database by:..... Authorised by:.....									
DAT Batch No																					
PS		IgG		IgA		IgM		C3c		C3d		Ctl									
Reagent																					