Cold enough for you?

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Cold enough for you?

CASE STUDY

- 66 year old male presented to the ER with chest pain, SOA & generalized weakness
- CT chest scan did not show evidence of PE
- Vitals: BP 129/79, pulse 131, temp 97.6, pulse ox 95%
- EKG showed sinus tachycardia at 111 bpm

LAB RESULTS

- WBC = 9.4
- Hgb = 9.8
- Sodium = 139
- Potassium = 4.3
- CO_2 = 20

LAB RESULTS

- BUN = 15
- Creatinine = 0.8
- Bilirubin = 2.5
- Serial Troponins <0.02

- Type & Screen requested

MEDICATIONS

- Acetaminophen
- Albuterol
- Atorvastatin
- Enoxaparin
- Folic acid
- Furosemide
- Insulin
- Metoprolol
- Valproic acid

SAMPLE REFERRED FOR:

- ABO/Rh grouping
- Antibody ID
- Positive DAT investigation

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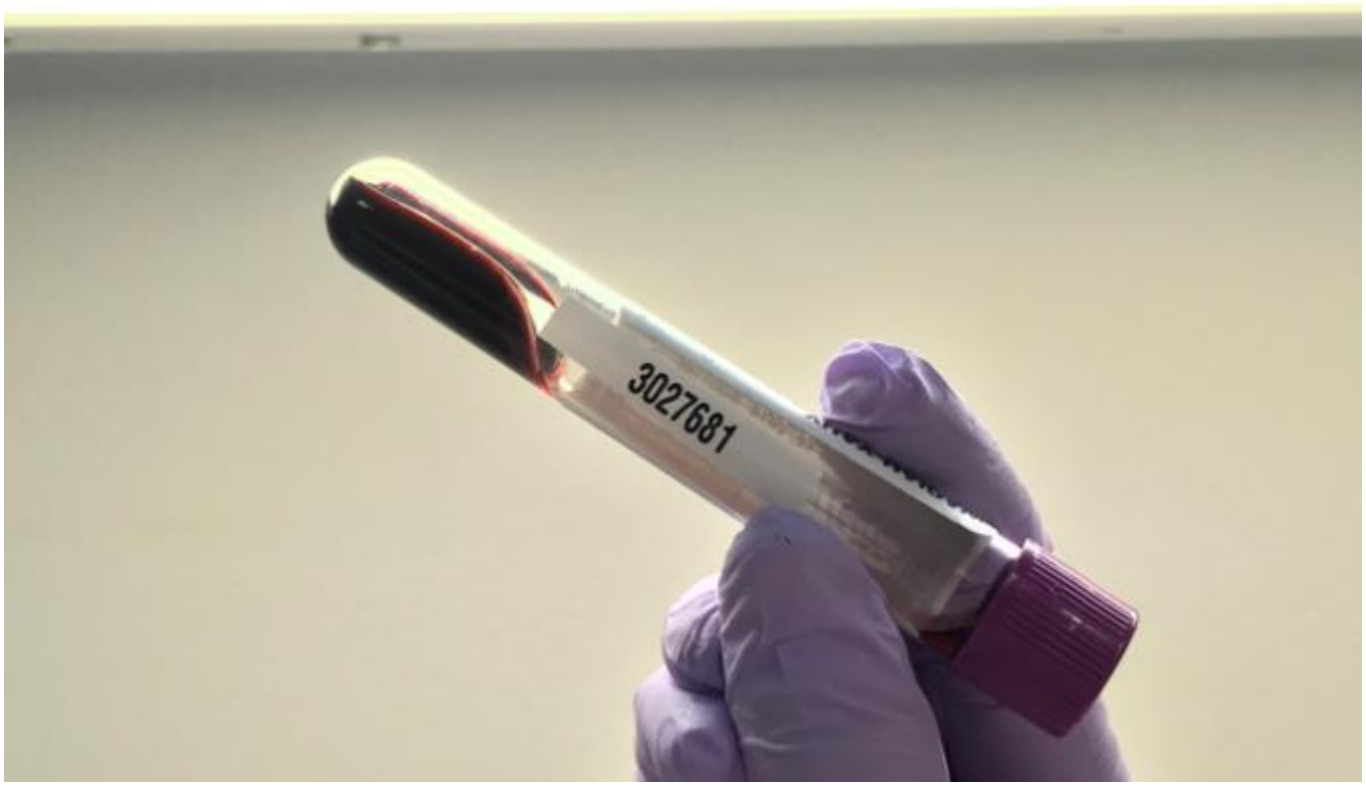

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ABO/RH
(NO WONDER THEY SENT IT OFF!)

Anti-A	Anti-B	A1 cells	A2 cells	B cells	O cells	Auto cont	Anti-D	Rh Cont
2+	2+	4+	4+	4+	4+	4+	3+	3+
warm wash x 8:								
1+	1+						2+	2+
Prewarm, no spin		$3+^{s}$	$3+^{s}$	$3+^{s}$	$3+^{s}$	$3+^{s}$		

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DAT

Poly	IgG	C	Saline
3+	3+	3+	1+
warm washed x 8:			
3+	(+)	$3+^{s}$	(+)

ACID ELUATE

		Rh					Kell		Duffy		Kidd		MNS				Results		
		D	C	E	c	e	K	k	Fy^a	Fy^b	Jk^a	Jk^b	M	N	S	s	5" RT	PEG IAT	v cells
1	R_1R_1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	**0**	**0**	√
2	R_1R_1	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	**0**	**0**	√
3	R_2R_2	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	**0**	**0**	√
4	R_0r	+	0	0	+	+	0	+	0	0	+	0	+	+	0	+	**0**	**0**	√
5	r'r	0	+	0	+	+	0	+	+	0	+	0	+	+	0	0	**0**	**0**	√
6	r"r	0	0	+	+	+	0	+	0	+	+	+	0	+	0	+	**0**	**0**	√
7	rr	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	**0**	**0**	√
8	rr	0	0	0	+	+	0	+	+	+	0	+	0	+	+	0	**0**	**0**	√
9	rr	0	0	0	+	+	0	+	+	+	0	+	+	0	0	+	**0**	**0**	√
10	R_1R_1	+	+	0	0	+	0	+	+	0	+	+	+	+	+	0	**0**	**0**	√
11	R_2R_2	+	0	+	+	0	+	+	0	0	+	+	0	+	+	+	**0**	**0**	√

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ACID ELUATE

No alloantibodies detected in the eluate

His medications that have been associated with +DAT:

- Acetaminophen
- Furosemide
- Insulin

COLD SCREEN

	I	II	III	AC	I- (i+)
30” RT	$3+^{s}$	$3+^{s}$	$3+^{s}$	$3+^{s}$	3+
30” 4C	4+	4+	4+	4+	$3+^{s}$

INITIAL PLASMA PANEL

		Rh					Kell		Duffy		Kidd		MNS				Results		
		D	C	E	c	e	K	k	Fy^a	Fy^b	Jk^a	Jk^b	M	N	S	s	5” RT	LISS 37C	LISS IAT
1	R_1R_1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	**2+**	**3+^{s}**	@
2	R_1R_1	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	**1+^{s}**	**3+^{s}**	@
3	R_2R_2	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	**1+^{s}**	**3+^{s}**	@
4	R_0r	+	0	0	+	+	0	+	0	0	+	0	+	+	0	+	**2+**	**3+^{s}**	@
5	r’r	0	+	0	+	+	0	+	+	0	+	0	+	+	0	0	**1+^{s}**	**3+^{s}**	@
6	r”r	0	0	+	+	+	0	+	0	+	+	+	0	+	0	+	**2+**	**3+^{s}**	@
7	rr	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	**1+^{s}**	**3+^{s}**	@
8	rr	0	0	0	+	+	0	+	+	+	0	+	0	+	+	+	**1+**	**3+^{s}**	@
9	rr	0	0	0	+	+	0	+	+	+	0	+	+	0	0	+	**2+**	**3+^{s}**	@
10	R_1R_1	+	+	0	0	+	0	+	+	0	+	+	+	+	+	0	**2+**	**3+^{s}**	@
11	R_2R_2	+	0	0	+	+	+	+	0	0	+	+	0	+	+	+	**2+**	**3+^{s}**	@
Auto																	**3+^{s}**	**4+**	@

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FICIN PANEL

		Rh					Kell		Duffy		Kidd		MNS				Results	
		D	C	E	c	e	K	k	Fy^a	Fy^b	Jk^a	Jk^b	M	N	S	s	30”37C no spin	IAT
1	R_1R_1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	**3+^{s}**	@
2	R_1R_1	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	**3+^{s}**	@
3	R_2R_2	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	**3+^{s}**	@
4	R_0r	+	0	0	+	+	0	+	0	0	+	0	+	+	0	+	**3+^{s}**	@
5	r’r	0	+	0	+	+	0	+	+	0	+	0	+	+	0	0	**3+^{s}**	@
6	r”r	0	0	+	+	+	0	+	0	+	+	+	0	+	0	+	**3+^{s}**	@
7	rr	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	**3+^{s}**	@
8	rr	0	0	0	+	+	0	+	+	+	0	+	0	+	+	+	**3+^{s}**	@
9	rr	0	0	0	+	+	0	+	+	+	0	+	+	0	0	+	**3+^{s}**	@
10	R_1R_1	+	+	0	0	+	0	+	+	0	+	+	+	+	+	0	**3+^{s}**	@
11	R_0r	+	0	0	+	+	+	+	0	0	+	+	0	+	+	+	**3+^{s}**	@
Auto																	**NT**	**NT**

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PREWARMED PANEL

		Rh					Kell		Duffy		Kidd		MNS				Results		
		D	C	E	c	e	K	k	Fy^a	Fy^b	Jk^a	Jk^b	M	N	S	s	Prewarm 60" 37C Warm wash IAT		
1	R_1R_1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	@		
2	R_1R_1	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	@		
3	R_2R_2	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	@		
4	R_0r	+	0	0	+	+	0	+	0	0	+	0	+	+	0	+	@		
5	r'r	0	+	0	+	+	0	+	+	0	+	0	+	+	0	0	@		
6	r"r	0	0	+	+	+	0	+	0	+	+	+	0	+	0	+	@		
7	rr	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	@		
8	rr	0	0	0	+	+	0	+	+	+	0	+	0	+	+	+	@		
9	rr	0	0	0	+	+	0	+	+	+	0	+	+	0	0	+	@		
10	R_1R_1	+	+	0	0	+	0	+	+	0	+	+	+	+	+	0	@		
11	R_2R_2	+	0	+	+	0	+	+	0	0	+	+	0	+	+	+	@		
Auto																	@		

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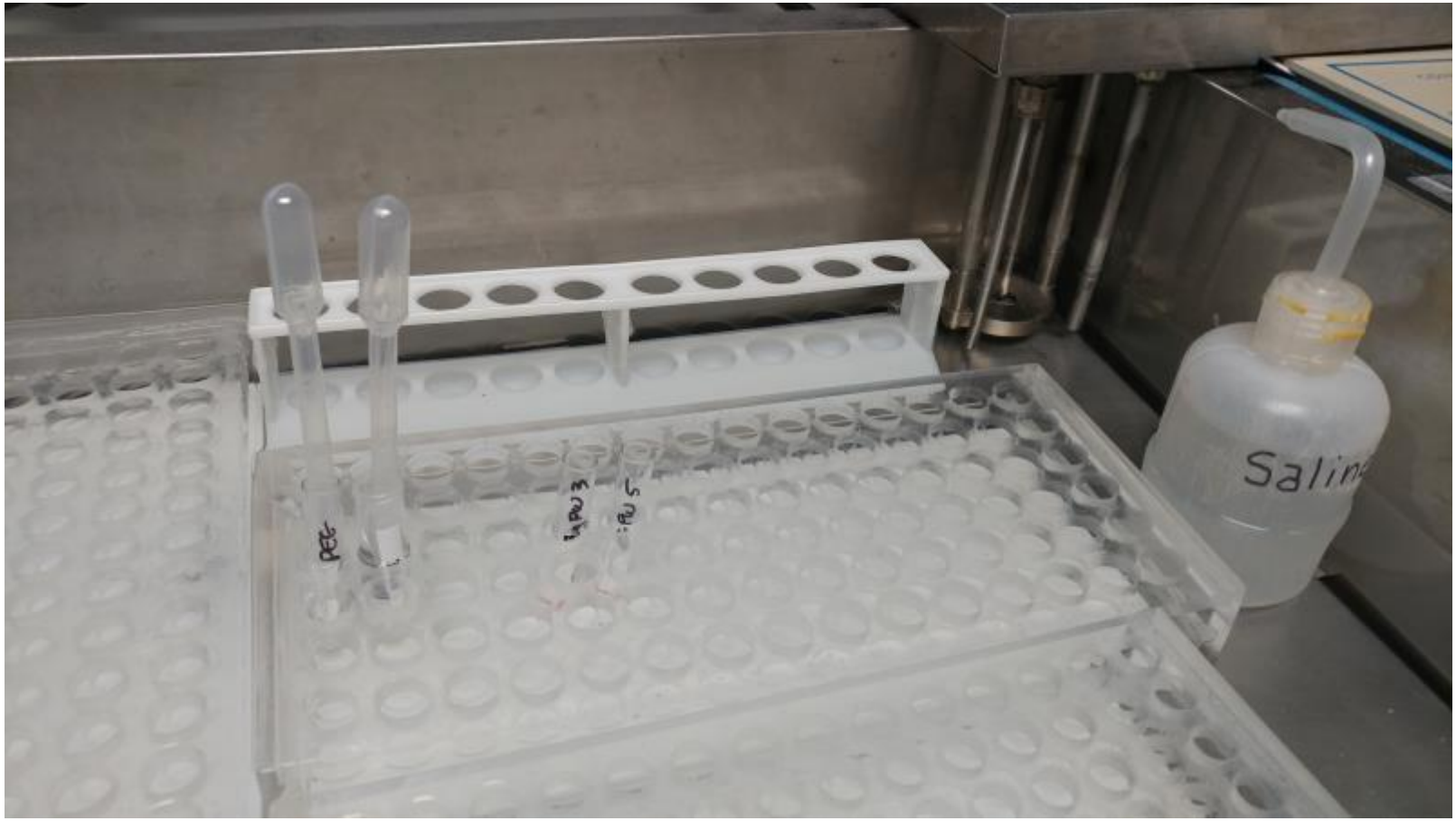

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PREWARMED PANEL

		Rh					Kell		Duffy		Kidd		MNS				Results		
		D	C	E	c	e	K	k	Fy^a	Fy^b	Jk^a	Jk^b	M	N	S	s	Prewarm 60" 37C Warm wash IAT		
1	R_1R_1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	@		
2	R_1R_1	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	@		
3	R_2R_2	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	@		
4	R_0r	+	0	0	+	+	0	+	0	0	+	0	+	+	0	+	@		
5	r'r	0	+	0	+	+	0	+	+	0	+	0	+	+	0	0	@		
6	r"r	0	0	+	+	+	0	+	0	+	+	+	0	+	0	+	@		
7	rr	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	@		
8	rr	0	0	0	+	+	0	+	+	+	0	+	0	+	+	+	@		
9	rr	0	0	0	+	+	0	+	+	+	0	+	+	0	0	+	@		
10	R_1R_1	+	+	0	0	+	0	+	+	0	+	+	+	+	+	0	@		
11	R_2R_2	+	0	+	+	0	+	+	0	0	+	+	0	+	+	+	@		
Auto																	@		

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SO WHAT TO DO NEXT??

Has the patient been recently transfused?

IF no: cold autoadsorption

DTT treat plasma

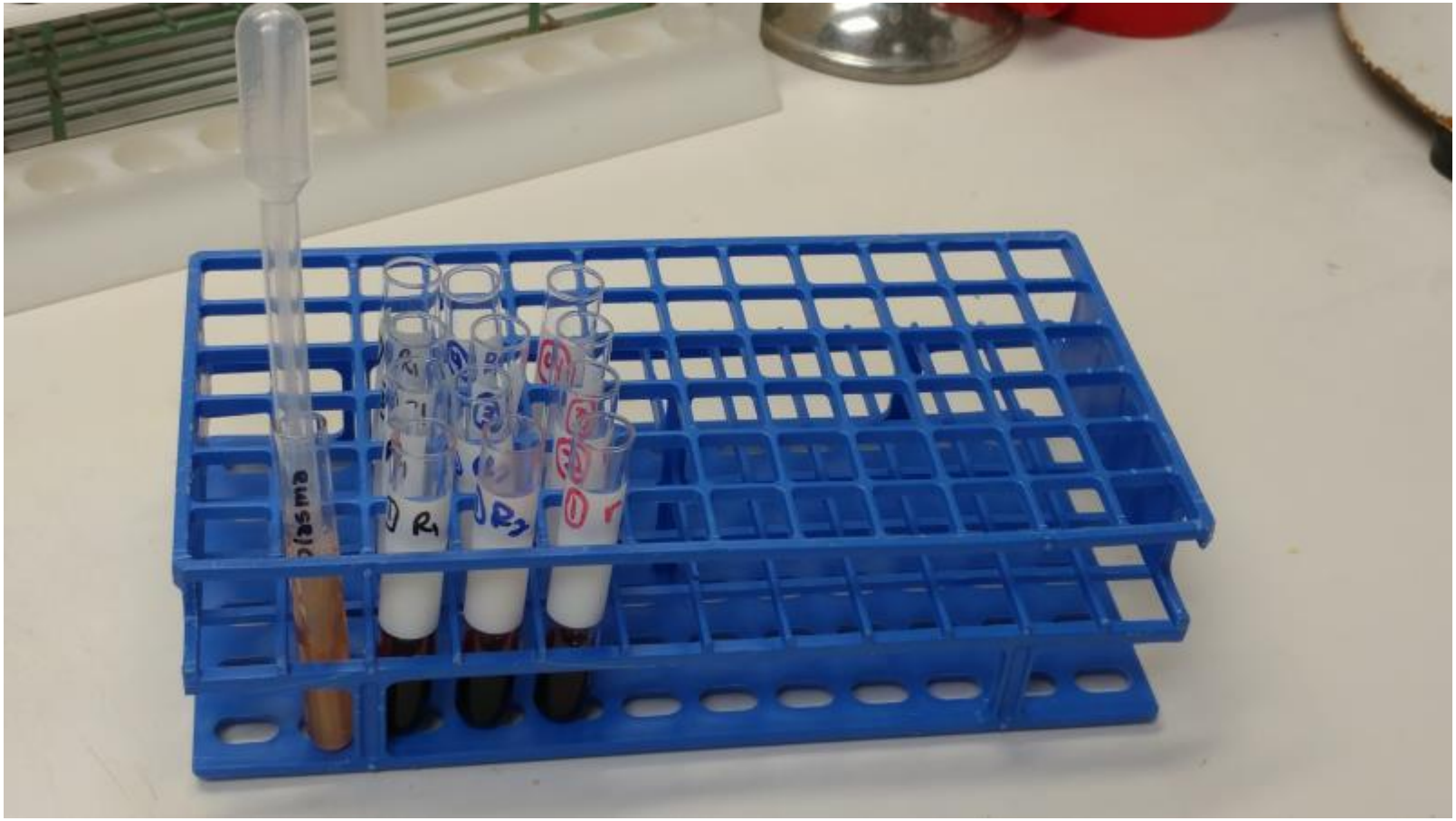
IF yes: cold alloadsorption

DTT treat plasma

Patient had not been recently transfused BUT . . .

- **Not enough rbcs**
- **Still need to resolve ABO/Rh**

COLD ALLOADSORPTIONS



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ICE, ICE BABY!

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ALLOADSORPTION X4 AT 4C USING FICIN TREATED DONOR CELLS

	R_1R_1 K- Jk(b-)	R_2R_2 K- Jk(a-)	rr K- Jk(a-)
I	@	@	@
II	@	@	@
III	@	@	@

DTT TREATMENT OF PLASMA

	Sample/ Control	0.01 M DTT	Saline	Incubate at 37C for 15”
Patient DTT treated	500 uL	500 uL	0	Yes
Patient untreated	500 uL	0	500 uL	No
IgG control DTT treated	200 uL	200 uL	0	Yes
IgG control untreated	200 uL	0	200 uL	No
IgM control DTT treated	200 uL	200 uL	0	Yes
IgM control untreated	200 uL	0	200 uL	No

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UNTREATED PLASMA + SALINE

		Rh					Kell		Duffy		Kidd		MNS				Results		
		D	C	E	c	e	K	k	Fy^a	Fy^b	Jk^a	Jk^b	M	N	S	s	5" RT	LISS 37C	LISS IAT
1	R_1R_1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	1+	3+	@
2	R_1R_1	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	1+	3+	@
3	R_2R_2	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	1+	3+	@
4	R_0r	+	0	0	+	+	0	+	0	0	+	0	+	+	0	+	1+	3+	@
5	r'r	0	+	0	+	+	0	+	+	0	+	0	+	+	0	0	1+	3+	@
6	r"r	0	0	+	+	+	0	+	0	+	+	+	0	+	0	+	1+	3+	@
7	rr	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	1+	3+	@
8	rr	0	0	0	+	+	0	+	+	+	0	+	0	+	+	+	1+	3+	@
9	rr	0	0	0	+	+	0	+	+	+	0	+	+	0	0	+	1+	3+	@
10	R_1R_1	+	+	0	0	+	0	+	+	0	+	+	+	+	+	0	1+	3+	@
11	R_0r	+	0	0	+	+	+	+	0	0	+	+	0	+	+	+	1+	3+	@
Auto																	NT	NT	NT

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DTT TREATED PLASMA

		Rh					Kell		Duffy		Kidd		MNS				Results		
		D	C	E	c	e	K	k	Fy^a	Fy^b	Jk^a	Jk^b	M	N	S	s	5” RT	LISS 37C	LISS IAT
1	R_1R_1	+	+	0	0	+	0	+	+	+	+	+	+	+	+	+	**0**	**0**	**0**√
2	R_1R_1	+	+	0	0	+	+	+	0	+	0	+	0	+	0	+	**0**	**0**	**0**√
3	R_2R_2	+	0	+	+	0	0	+	+	0	+	+	+	0	+	+	**0**	**0**	**0**√
4	R_0r	+	0	0	+	+	0	+	0	0	+	0	+	+	0	+	**0**	**0**	**0**√
5	r’r	0	+	0	+	+	0	+	+	0	+	0	+	+	0	0	**0**	**0**	**0**√
6	r”r	0	0	+	+	+	0	+	0	+	+	+	0	+	0	+	**0**	**0**	**0**√
7	rr	0	0	0	+	+	+	+	0	+	+	0	+	0	+	+	**0**	**0**	**0**√
8	rr	0	0	0	+	+	0	+	+	+	0	+	0	+	+	+	**0**	**0**	**0**√
9	rr	0	0	0	+	+	0	+	+	+	0	+	+	0	0	+	**0**	**0**	**0**√
10	R_1R_1	+	+	0	0	+	0	+	+	0	+	+	+	+	+	0	**0**	**0**	**0**√
11	R_0r	+	0	0	+	+	+	+	0	0	+	+	0	+	+	+	**0**	**0**	**0**√
Auto																	**NT**	**NT**	**NT**

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MORE ON DTT CONTROL

Group A donor plasma that contains anti-E

	B cells
	I.S.
DTT treated control plasma	0
Untreated (saline) control plasma	3+

	r"r cells
	PEG IAT
DTT treated control plasma	2+
Untreated (saline) control plasma	2+

ABO BACK TYPE: PLASMA + DTT

	A1 cells	A2 cells	B cells	O cells	Auto cont
I.S.	1+	0	1+	0	0*
10” RT	3+	3+	3+	0	0*

ABO BACK TYPE: PLASMA + SALINE

	A1 cells	A2 cells	B cells	O cells	Auto cont
I.S.	2+	2+	2+	2+	2+*
10”RT	3+	3+	3+	3+	3+*

*chloroquine treated cells

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CHLOROQUINE DIPHOSPHATE TREATMENT OF RBCS

Principle:

Chloroquine diphosphate can dissociate antibody on rbcs without significantly affecting blood group antigens

CHLOROQUINE DIPHOSPHATE TREATMENT OF RBCS

- Wash cells x 3
- Add 10 drops of packed cells to a 12 x 75 tube
- Add 40 drops of chloroquine diphosphate solution (Gamma-Quin®)
- Incubate for up to 2 hours at room temp
- Wash cells x 3
- Resuspend to 3-4% suspension
- Run DAT to confirm sufficient dissociation

CHLOROQUINE TREATED FRONT TYPE

	Anti-A	Anti-B	Anti-A,B	Anti-D	Rh control
I.S.	0	0	0	0	0
10” RT	0	0	0	NT	NT
Weak D test				0√	0√

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CASE CONCLUSION

- **Patient is group O, Rh negative**
- **DAT invalid; eluate was nonreactive**
- **Strong cold IgM autoantibody in the plasma**
- **No underlying IgG alloantibodies**

COLD AUTOANTIBODIES ARE ASSOCIATED WITH

- **Complement on the patient's red cells**
- **Usually NOT clinically significant**
- ***Mycoplasma pneumoniae* infection**
- **Lymphoma, CLL, Waldenstrom macroglobulinemia**
- **Often have I-specificity**

HOSPITAL DECLINED

Testing for clinical significance of cold autoantibody

- **4C titer**
- **Thermal amplitude**

Clinical picture indicated the cold autoantibody was significant

TRANSFUSION RECOMMENDATION

- **Keep the patient and his environment warm**
- **Send sample to National Center for Blood Group Genomics to obtain predicted phenotype**
- **Give blood slowly and monitor closely for signs of a transfusion reaction**

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Thank you!! Questions??