

ABO Anomalies

Ruth Smith

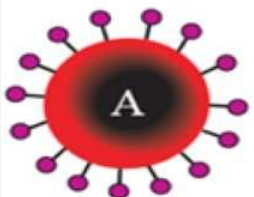
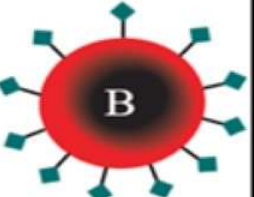
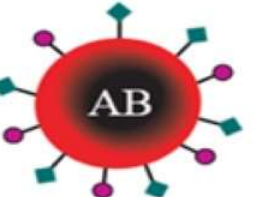
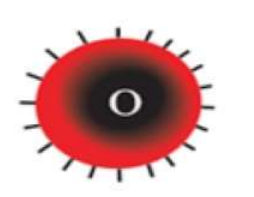






Senior BMS

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Landsteiners Law

- States that :
“The lack of an A or B Antigen results in the production of the corresponding Antibody”

	Group A	Group B	Group AB	Group O
Red blood cell type				
Antibodies in Plasma	 Anti-B	 Anti-A	None	 Anti-A and Anti-B
Antigens in Red Blood Cell	 A antigen	 B antigen	 A and B antigens	None

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Expected grouping results

ABO Group	Red cells vs Anti A	Red cells vs Anti B	Plasma vs A1 Cells	Plasma vs B Cells
A	+	-	-	+
B	-	+	+	-
AB	+	+	-	-
O	-	-	+	+

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Anomalous Results

- Reactions which do not fit into the expected pattern need further investigation. NEVER assign a blood group until all investigations are complete.
- Full grouping MUST be performed on all new patients/donors.
- Repeat test to ensure reactions are genuine.
- If test performed manually rule out any technical errors such as incorrect tube labelling, transposition, SOP not followed etc.
- If discrepancy is genuine additional tests may need to be performed to try and resolve the problem.



Additional Antigens

- Unexpected positive reactions in the forward group.
- Acquired B Antigen (very unlikely)
- Red cells sensitised with another antibody e.g. Warm or Cold AIHA.
- Chimerism
- Panagglutination (Whartons jelly)



Missing Antigens

- Unexpected negative/weak reactions in the forward group.
- ABO subgroup
- Disease state e.g. leukaemia/cancer
- Foetus/Newborn with poorly developed antigens.



Missing Antibodies.

- Missing/weak reactions in the reverse group.
- Disease state – Hypogammaglobulinemia
- Age of individual (<5 years or >80 years)
- Post ABO incompatible bone marrow/stem cell transplant
- Transfusion of plasma components/plasma exchange



Additional Antibodies

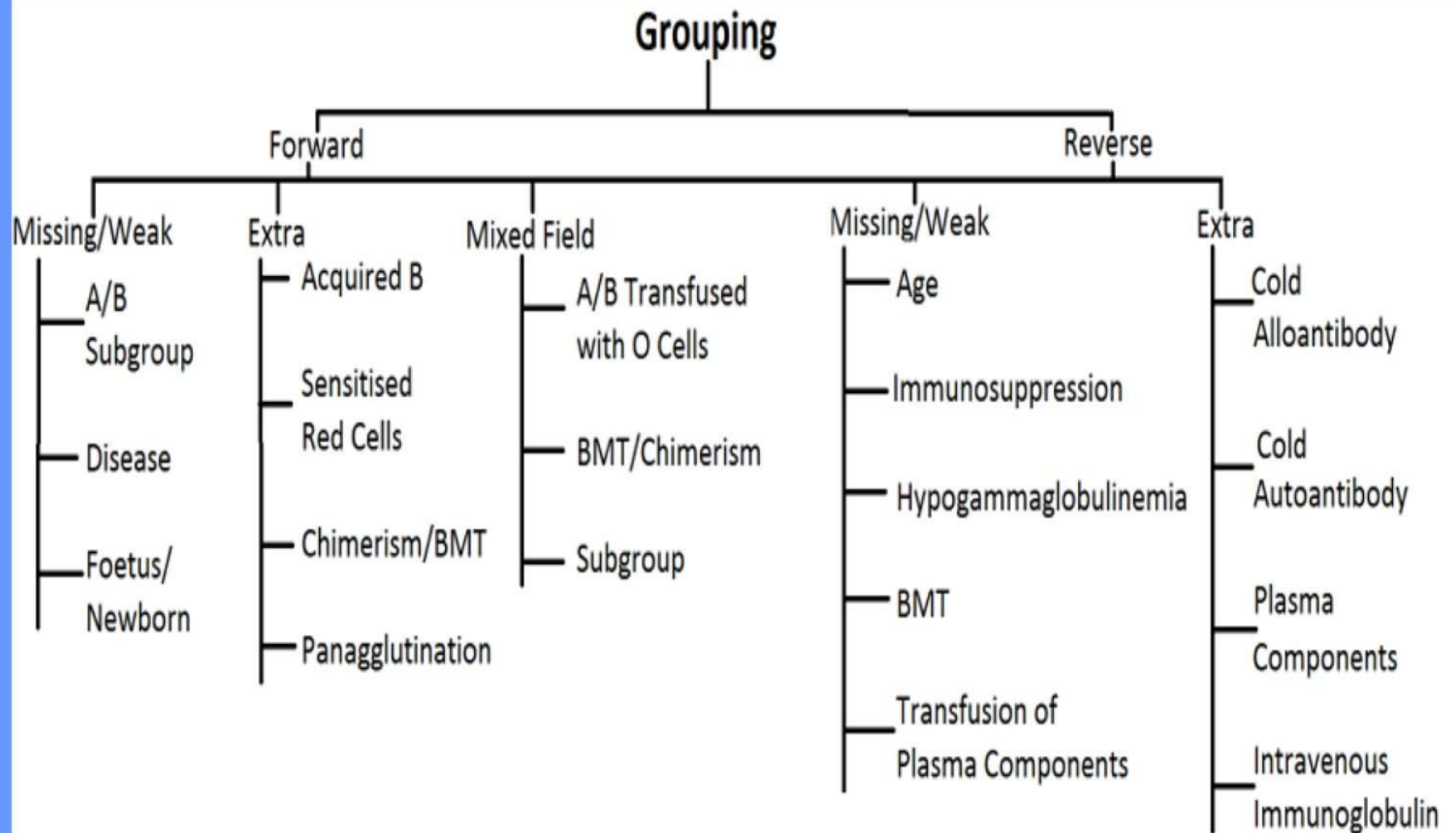
- Unexpected positive reactions with A or B cells in the reverse group.
- Cold reacting alloantibodies e.g. Anti A1, Anti M, Anti P1
- Cold reacting autoantibodies e.g. Anti I
- Transfusion of ABO incompatible plasma products
- Treatment with Intravenous Immunoglobulin (IVIg)



Mixed Field Reactions

- Sample has 2 distinct populations
- ABO mismatched red cell transfusion
- Subgroup e.g. A3
- Chimerism
- BMT of different ABO type





Investigation of anomalous results (1)

- Before performing any additional tests:
- Repeat group
- Check historical group (if one available)
- Check diagnosis
- Check transfusion history
- Request fresh sample
- These steps may save time!



Investigation of anomalous results (2)

- If discrepancy appears to be genuine:
- Repeat group using different method
- Consider extended incubation times at either 4 degrees C or 37 degrees C as appropriate
- Use extended grouping reagents if available
- Consider Antibody screen/investigation/auto control
- Consider using washed red cells



MANUAL GROUPING WORKSHEET

Patient's Name	Hospital Number	Sample Number

Manual tube group

	Anti-A	Anti-B	Anti-D	AB Serum	A1 cells	A2 cells	B cells	O cells	Auto
Test									
A1 rr control									
A2 control									
B rr control									
O R1r									

A1 subtyping

	Test	A1 cells	A2 cells	Conclusion
Anti-A1				
AB serum				

3 cell screen

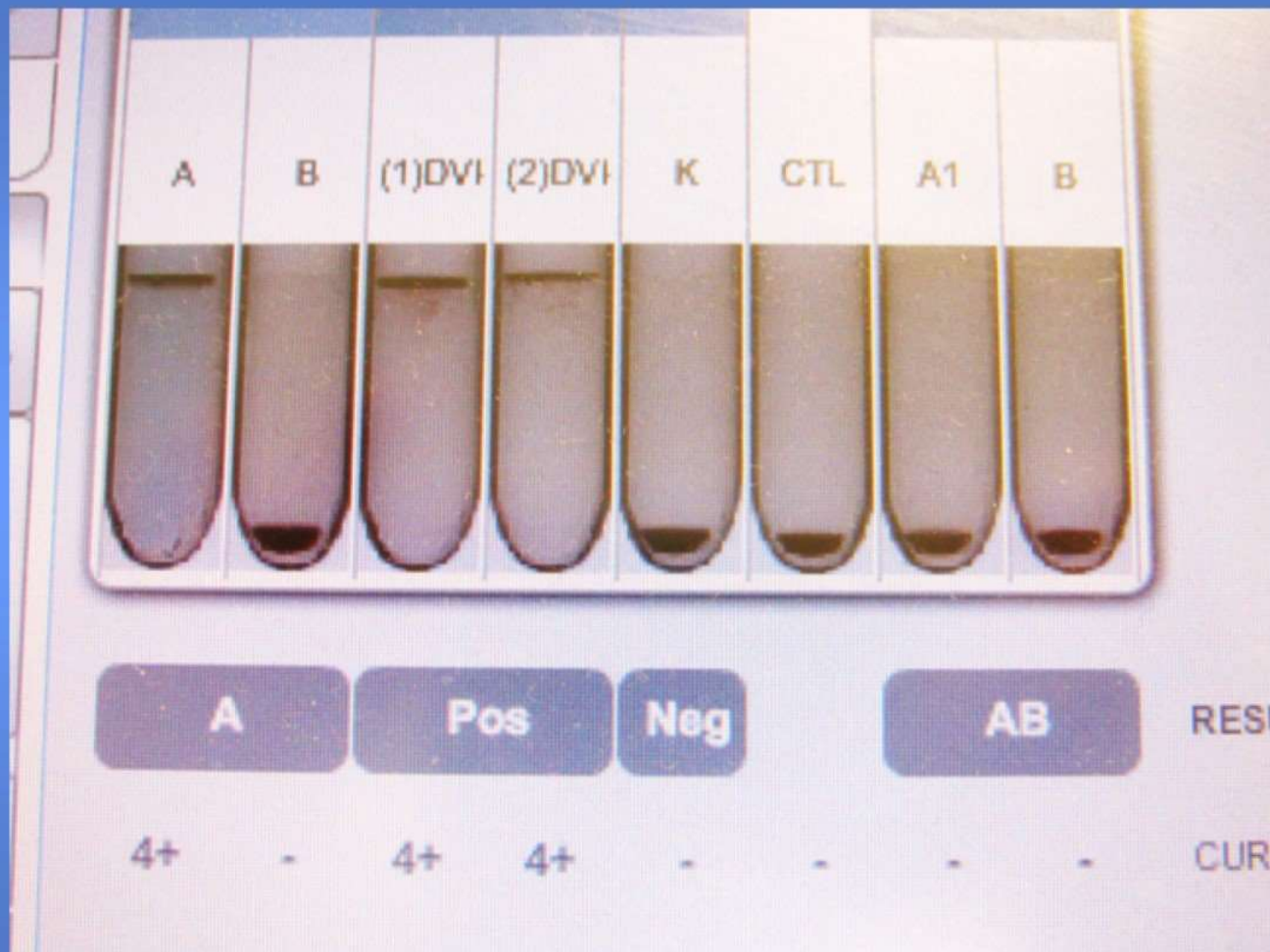
Test			Control	
Cell 1	Cell 2	Cell 3	KK (cell)	Kk (cell)

Reagents

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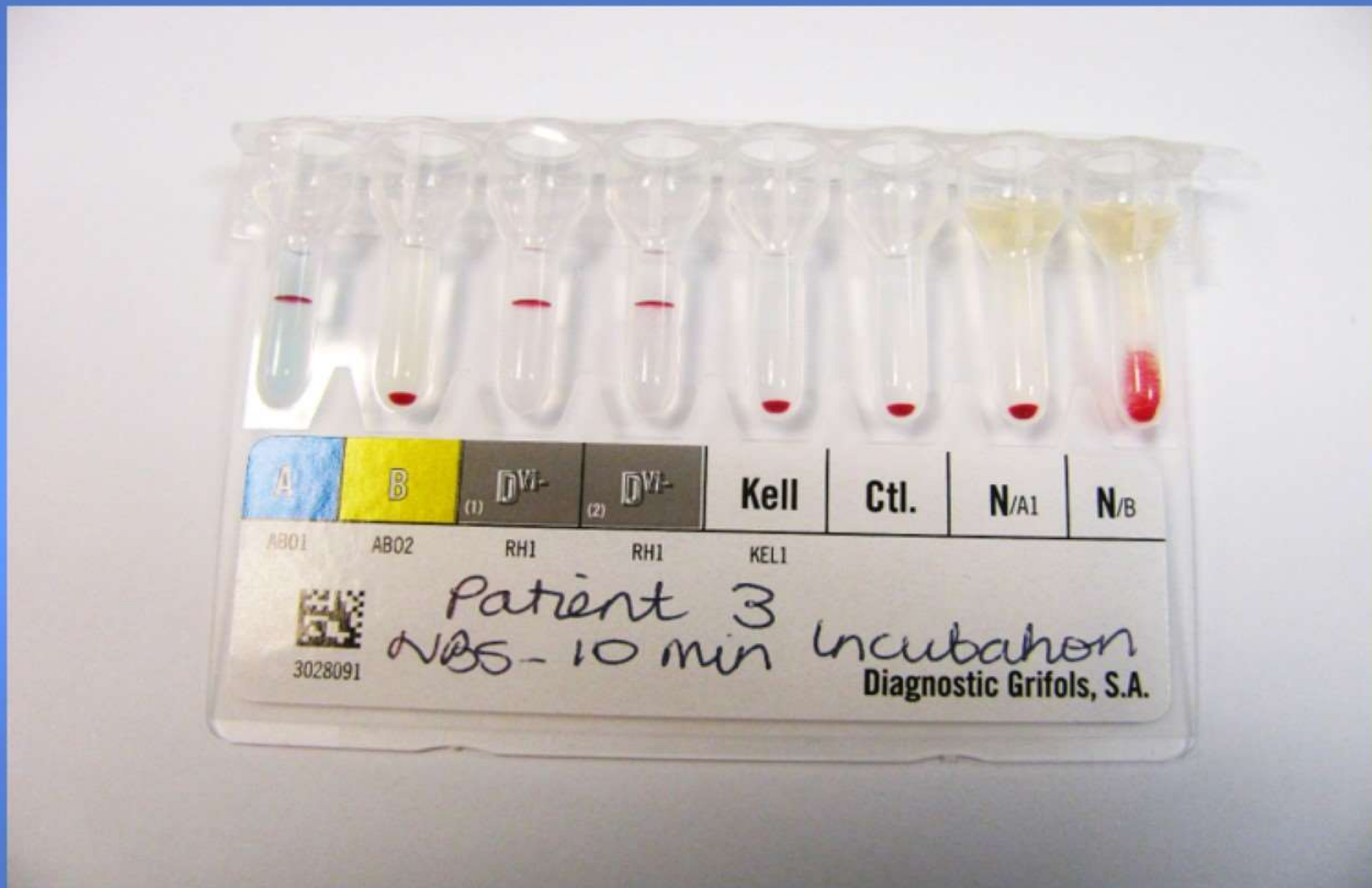
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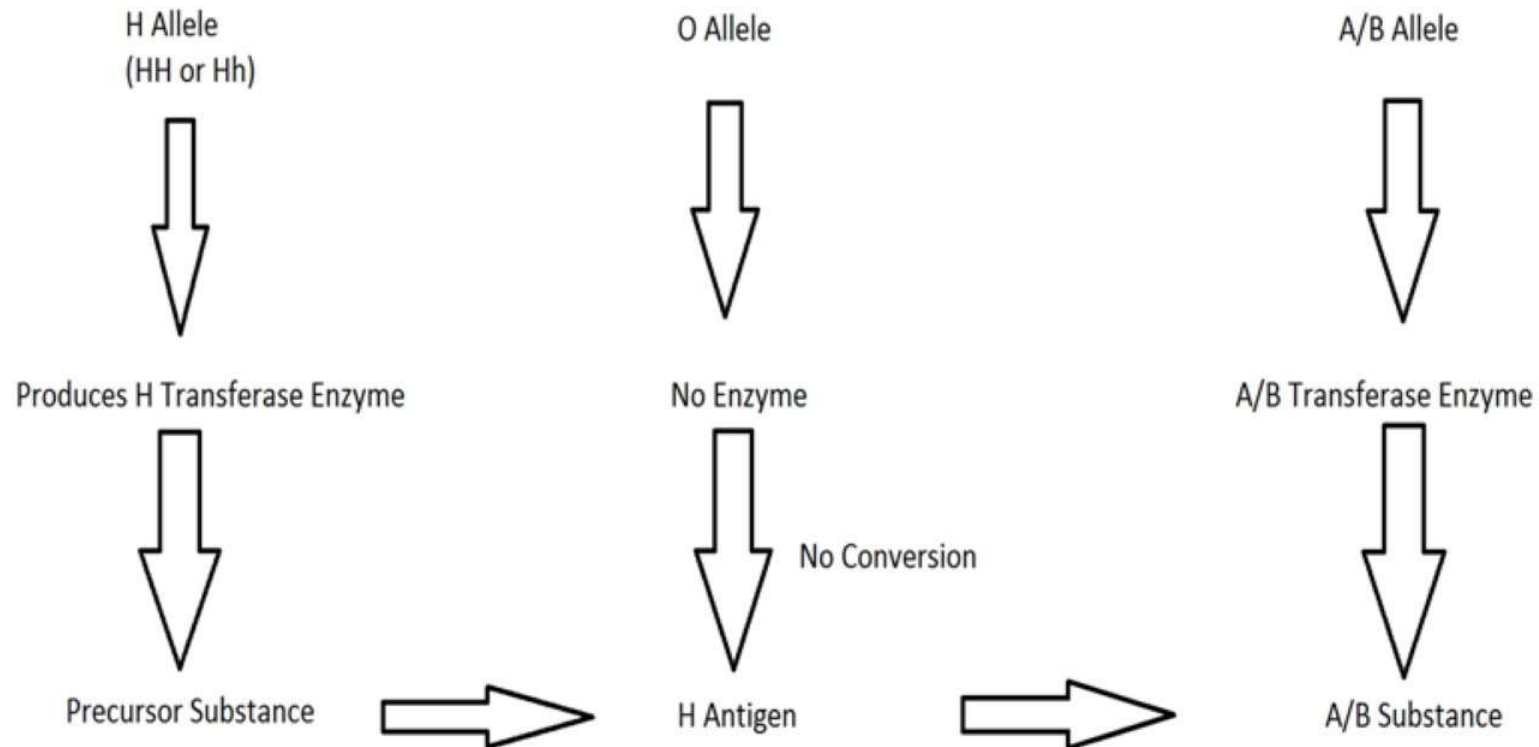




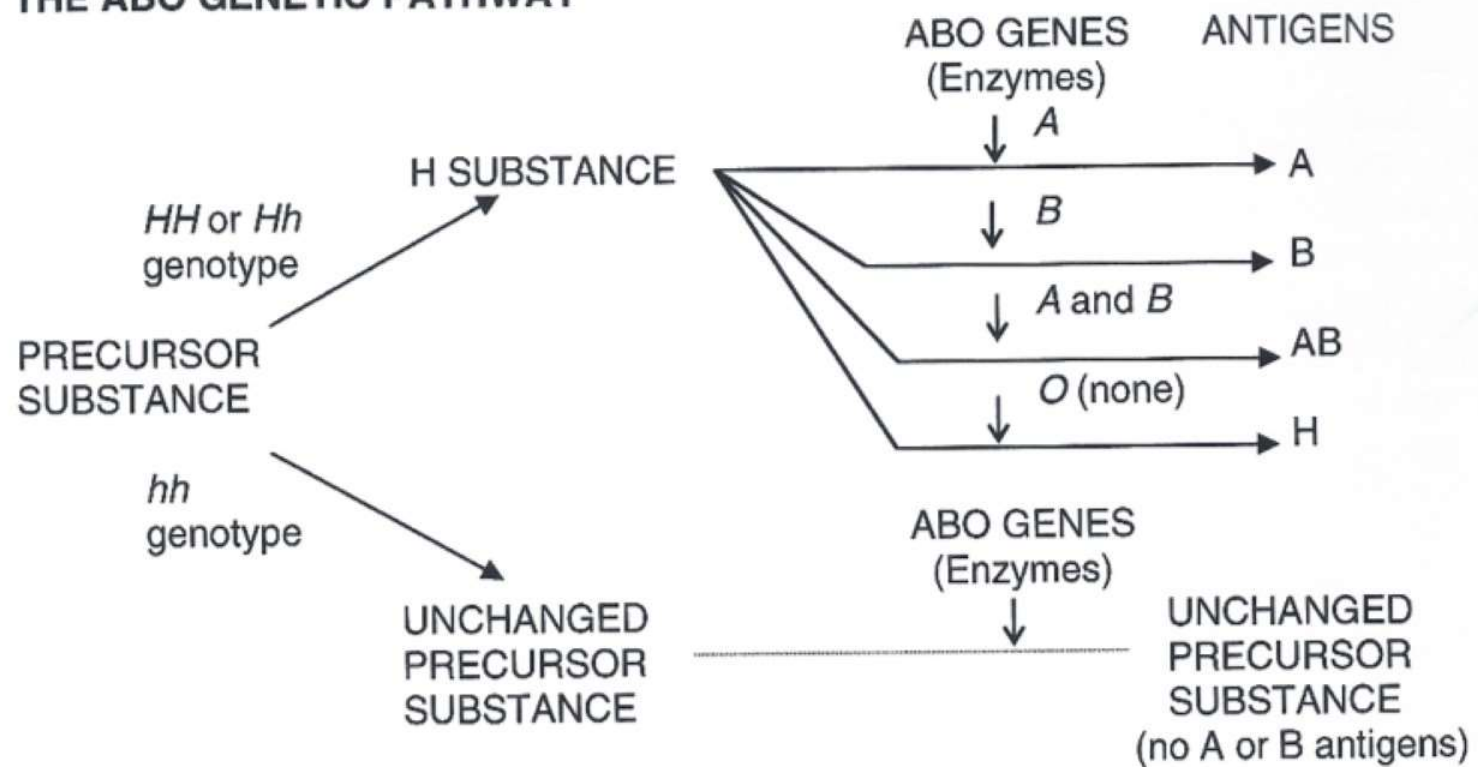
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Bombay Phenotype



THE ABO GENETIC PATHWAY



Bombay Grouping Results

	Anti A	Anti B	Anti H	A1 cells	B cells	O cells	Auto
Group O	0	0	4+	4+	4+	0	0
Group O (h)	0	0	0	4+	4+	4+	0

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Example 1

Red Cells vs Anti A	Red Cells vs Anti B	Plasma vs A1 Cells	Plasma vs B Cells
4+	0	2+	4+

Problem:

Cause:

Resolution:

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Example 1 cont

Anti A	Anti B	Anti A1	AB Serum	A1 Cells	A2 Cells	B Cells	O Cells	Auto
4+	0	0	0	2+	0	4+	0	0

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Example 1 cont

Anti A	Anti B	Anti A1	AB Serum	A1 Cells	A2 Cells	B Cells	O Cells	Auto
4+	0	4+	0	2+	2+	4+	2+	0

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Example 2

Red Cells vs Anti A	Red Cells vs Anti B	Plasma vs A1 Cells	Plasma vs B Cells
3+	1+	0	4+

Problem:

Cause:

Resolution:

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Example 3

Red cells vs Anti A	Red cells vs Anti B	Plasma vs A1 cells	Plasma vs B cells
0	0	0	3+

Problem:

Cause:

Resolution:

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Example 3 cont.

Red cells vs Anti A	Red cells vs Anti B	Red cells vs Anti AB	Plasma vs A1 cells	Plasma vs B cells
0	0	1+	0	3+

Indicates weak subgroup of A
e.g. Ax



Example 4

Red cells vs Anti A	Red cells vs Anti B	Plasma vs A1 cells	Plasma vs B cells
MF	0	1+	2+

Problem:

Cause:

Resolution:

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Example 5

Red cells vs Anti A	Red cells vs Anti B	Plasma vs A1 cells	Plasma vs B cells
0	0	0	0

Problem:

Cause:

Resolution:

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Example 6

Red cells vs Anti A	Red cells vs Anti B	Control	Plasma vs A1 cells	Plasma vs B cells
3+	3+	3+	NT	NT

Problem:

Cause:

Resolution:

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Example 7

Red cells vs Anti A	Red cells vs Anti B	Plasma vs A1 cells	Plasma vs B cells
4+	4+	0	1+

Problem:

Cause:

Resolution:

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Example 7 cont.

	Antibody Screen	Auto control	Conclusion
Patient 1	Positive	Negative	Cold alloantibody
Patient 2	Positive	Positive	Cold autoantibody

Cold alloantibody – perform identification panel
Cold autoantibody- Use pre warming technique



Example 8 (Patient JJ)

Red cells vs Anti A	Red cells vs Anti B	Plasma vs A1 cells	Plasma vs B cells
0	3+	0	0

Problem:

Cause:

Resolution:

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Example 9

Red cells Vs Anti A	Red cells Vs Anti B	Plasma Vs A1 cells	Plasma Vs B cells
0	MF	2+	+/-

Cause:

Problem:

Resolution:

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Remember:

- NEVER report a group until all investigations are complete.
- Only issue group O red cells until discrepancy has been resolved.
- Do NOT assume that the forward group is correct.



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- Thank you for listening.
- Any Questions???



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