Identification of Anti-TSEN in Antenatal Patient – Case Study

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BLOOD SERVICE

Case Study

- Patient 34 year old female
- Presented for routine antenatal screen at approximately 5 weeks.
- Clinical history patient:
  - On Thyroxine
  - No previous transfusions
  - 4th pregnancy, 2 miscarriages, 1 child

- Testing at the pathology lab
  - ABO group was performed
  - 3-Cell Antibody Screen performed
- Results:

ABO Group	RhD	Antibody Screen		
		Cell 1	Cell 2	Cell 3
A	Positive	0	0	8 (3+)

Further Testing at the Pathology Lab

- Antibody Identification using the 11 Cell Panel.

Cell Number	1	2	3	4	5	6	7	8	9	10	11	Auto
Panel A	0	0	0	0	0	0	0	0	0	0	0	0
Panel B	0	0	0	0	0	0	0	0	0	0	0	0
Panel C (enzyme)	0	0	0	0	0	0	0	0	0	0	0	0

- Results showed there was no antibodies detected.
- The original 3-cell screen was repeated with a different batch.

Antibody Screen (new Batch)		
Cell 1	Cell 2	Cell 3
0	0	0

Samples Referred to Red Cell Reference

- Samples referred to the Red Cell Reference in QLD
- Request was for an ABID with a query to low incidence antigen with a 3+ reaction in one cell.

- Due to the small volume of sample received a full antibody panel was not performed.
- The screening cells were requested to enable testing and identification.
- Testing commenced in the lab:…….

Testing at the Red Cell Reference Lab

- Firstly a ABO group and full extended phenotype was performed on the patient's cells.

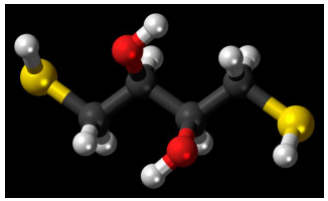
ABO Group	RhD	Phenotype
A_1	Positive	C+E-c+e+ K- Fya+Fyb+ Jka+Jkb- M+N- S+s-

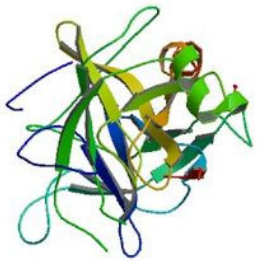
- The patient's plasma was tested against screening cell 3 and the auto cells.

Testing		
Method	Cell 3	Auto
Saline RT	0	0
Saline 37°C	0	0
IAT + PEG	10	0
Enzyme IAT	0	0

Further Testing at ARCBS

- Cell 3 (reactive cell) and the patient's red cells were chemically treated using:
  - 0.2M DTT (Dithiothreitol)
  - Trypsin
  - α-Chymotrypsin





Chemical	IAT-PEG	
	Cell 3	Auto
0.2M DTT (Dithiothreitol)	12	0
Trypsin	10	0
α-Chymotrypsin	0	0

- Reaction is destroyed in Papain and α-Chymotrypsin only.

Where to next….

- More samples were requested from the patient and her partner.
- Patient's plasma tested against rare cells with glycophorin low incidence antigens in saline and IAT.

	Vw+	Hut+	Mur+	Hop+	Hil+	TSEN+	Bun+	A_1 cell	Cell 3	Cell 1
Saline RT	0	0	0	0	0	0	0	N/A	0	0
IAT + PEG	0	0	0	10	0	10	0	0	10	0

- Antibody is Anti-TSEN

- Patient's cells and Cell 3 typed for Mia, Vw, Mur, Mut, MiIII, and Hil,
- Both the Cell 3 and the patient were negative for all these antigens
- No reliable monospecific anti-TSEN available for typing.

Partner's samples

- Partner's samples arrive and tested…
- Partner's red cells typed as
  - Group O RhD Positive
  - C-E+c+e+, K-, Fy(a+b+), Jk(a-b+), M-N+S+s+
  - Mia(-), Vw(-), MUT(-), Mur(-), MiIII(-), Hil(-)

- Partner's red cells were compatible with the patient's plasma in IAT tests.

  - So where has the Anti-TSEN come from?

Sequencing…

- Sequencing to confirm the TSEN negative phenotype of both samples.
- Sequencing was performed using the TruSight™ One sequencing panel

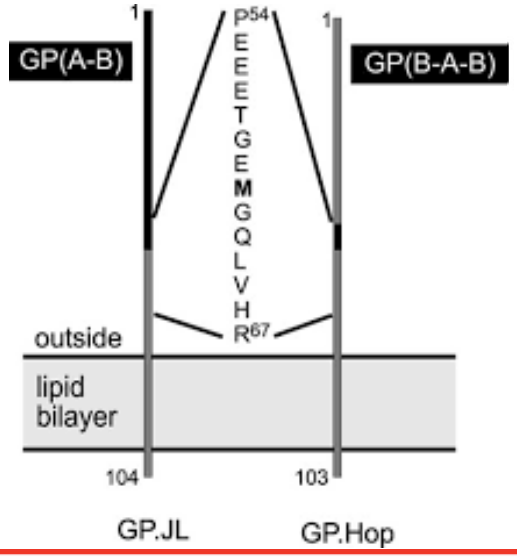
- Patient's samples:
  - Predicted Genotype GYPA*01/*01 and GYPB*03/*03.
  - Predicted phenotype M+ N-, S+s-, TSEN neg
  - A novel hybrid was suggested, but would not affect the phenotype.
- Partner's Samples:
  - Predicted Genotype: GYPA*02/*02 and GYPB*03/*04
  - Predicted phenotype: M-N+, S+s+, TSEN neg

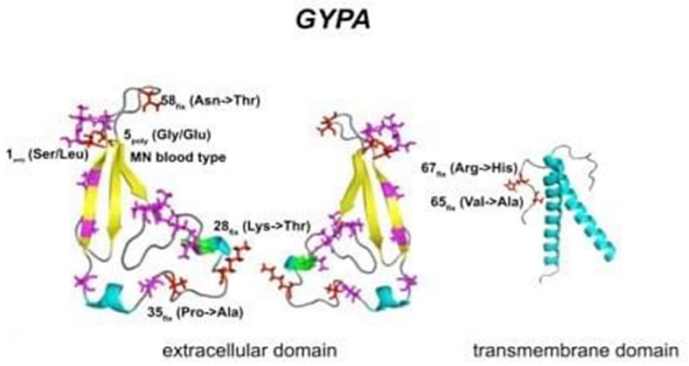
TSEN Antigen - Background

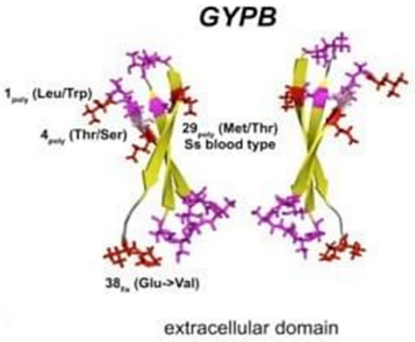
- TSEN Antigen (MNS33) is a low prevalence MSN blood group antigen.
- Named in 1992 and the occurrence is <0.01% in most populations

- Located at the junction of glycophorin A (GPA) to glycophorin B (GPB) in several hybrid glycophorin molecules.

- Associated with hybrid
  GP.JL (Mi.XI) and
  GP.Hop (Mi.IV)







Reference: Four Examples of Anti-TSEN and Three Examples of TSEN-Positive Erythrocytes, Storry, J.R etal; VoxSang 2000;79:175-179

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TSEN Antigen

- TSEN antigen occurs in Europeans, Southern Chinese, Taiwanese and in Hispanics.
- TSEN is usually found due to discrepant S typing or by detection of an antibody to a low prevalence antigen.
- TSEN is expressed when S antigen is present.
- 5 examples of Anti-TSEN have been reported.
  - 1 reported case of HDFN in 2003 and no Transfusion Reactions

Conclusions

- Patient's plasma contained Anti-TSEN antibody.
- Partner was TSEN negative, and had no other glycophorin related Miltenberger antigens.
- Patient has a potential novel hybrid allele and further Long Range PCR is required to investigate further.
- Anti-TSEN has been known to cause HDFN in pregnancy.
- Patient will need to be monitored during the pregnancy, although the partner is TSEN negative and compatible with the antibody.

Questions

- Where did the anti-TSEN come from?
- Could the Anti-TSEN be naturally occurring?
- What further testing could be done?
- Samples to be collected from the baby and siblings would be useful for further testing.

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