

“U” THOUGHT IT WAS BAD...

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 **New York** *Blood Center*



**Community
Blood Center**
Save a Life. *Right Here, Right Now.*

OBJECTIVES

- Describe the steps in identifying antibodies to high incidence antigens
- Recognize complexities associated with the Rh system
- Explain transfusion options available when antibodies to high incidence antigens are detected

HISTORY

- Hospital calls to say sending a sample
 - All cells tested in Gel were positive
 - Auto control negative
- Diagnosis: GI bleed
- Transfusion History:
 - 4 units transfused 3 months ago
 - No history of prior antibodies
- No units ordered at this time

INITIAL WORKUP

- ABO Rh: AB Positive

| Forward Typing | | | Reverse Typing | |
|----------------|--------|-----------------|----------------------|---------|
| Anti-A | Anti-B | Anti-D | A ₁ Cells | B Cells |
| 4+ | 4+ | 2+ ^S | 0 | 0 |

- DAT: Negative

| | |
|------------------|--------|
| Poly | Saline |
| (0) [✓] | 0 |

INITIAL PANEL

| | | Rh | | | | | MNSs | | | | Kell | | | | P | Duffy | | Kidd | | | Results | |
|----|--|----|---|---|---|---|------|---|---|---|------|---|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|---------|------------------|
| | | D | C | E | c | e | M | N | S | s | K | k | Kp ^b | Js ^b | P ₁ | Fy ^a | Fy ^b | Jk ^a | Jk ^b | Xg ^a | 5' RT | IAT |
| 1 | R ₂ R ₁ | + | + | + | 0 | + | + | + | 0 | + | + | + | + | + | + | + | 0 | + | 0 | + | 0 | 2+ |
| 2 | R ₁ ^w R ₁ | + | + | 0 | 0 | + | + | 0 | + | + | 0 | + | + | + | + | + | 0 | 0 | + | + | 0 | 3+ |
| 3 | R ₂ R ₂ | + | 0 | + | + | 0 | + | 0 | + | 0 | 0 | + | + | + | + | + | + | + | + | + | 0 | 3+ |
| 4 | Ror | + | 0 | 0 | + | + | 0 | + | 0 | 0 | 0 | + | + | 0 | + | 0 | 0 | + | 0 | + | 0 | 1+ |
| 5 | r'r | 0 | + | 0 | + | + | + | 0 | 0 | + | 0 | + | + | + | + | 0 | + | 0 | + | + | 0 | 2+ ^s |
| 6 | r''r | 0 | 0 | + | + | + | 0 | + | 0 | + | 0 | + | + | + | 0 | + | 0 | 0 | + | + | 0 | 2+ ^s |
| 7 | rr | 0 | 0 | 0 | + | + | + | + | 0 | + | + | + | + | + | + | + | 0 | + | + | + | 0 | 3+ |
| 8 | rr | 0 | 0 | 0 | + | + | + | + | 0 | + | 0 | + | + | + | + | + | 0 | + | 0 | + | 0 | 2+ ^s |
| 9 | R ₁ R ₁ | + | + | 0 | 0 | + | + | + | 0 | + | 0 | + | + | 0 | 0 | 0 | + | + | 0 | + | 0 | 2+ ^s |
| 10 | R ₁ R ₁ | + | + | 0 | 0 | + | + | 0 | + | + | + | 0 | + | + | + | + | + | + | 0 | + | 0 | 2+ ^s |
| 11 | rr | 0 | 0 | 0 | + | + | 0 | + | 0 | + | 0 | + | 0 | 0 | + | + | 0 | + | + | + | 0 | 2+ |
| AC | | | | | | | | | | | | | | | | | | | | | 0 | (0) [✓] |

FURTHER TESTING

- Ficin Panel: all cells positive
- Cold Screen: Reactive (2+ at 4C)
 - Not strong enough to consider cold autoantibody as source of reactivity
- Phenotype:

| | E | c | C | e | K | Fy ^a | Fy ^b | Jk ^a | Jk ^b | S | s |
|-------|---|----|----|----|---|-----------------|-----------------|-----------------|-----------------|---|----------------|
| RBC's | 0 | 4+ | 3+ | 4+ | 0 | 2+ | 0 [✓] | 2+ ^S | 0 | 0 | 0 [✓] |

RARE CELLS

| | | Rh | | | | | MNSs | | | | Kell | | Duffy | | Kidd | | Results |
|---|-------|----|---|---|---|---|------|---|---|---|------|---|-----------------|-----------------|-----------------|-----------------|------------------|
| | | D | C | E | c | e | M | N | S | s | K | k | Fy ^a | Fy ^b | Jk ^a | Jk ^b | PEG IAT |
| 1 | U- | + | 0 | 0 | + | + | + | + | 0 | 0 | 0 | + | 0 | 0 | + | + | (+) |
| 2 | U var | 0 | 0 | 0 | + | + | 0 | + | 0 | 0 | 0 | + | 0 | 0 | + | + | (0) [✓] |
| 3 | U- | + | 0 | 0 | + | + | + | + | 0 | 0 | 0 | + | 0 | + | + | 0 | (+) |
| 4 | U- | 0 | 0 | 0 | + | + | 0 | + | 0 | 0 | 0 | + | 0 | 0 | + | 0 | (0) [✓] |
| 5 | U- | + | 0 | 0 | + | + | 0 | + | 0 | 0 | 0 | + | 0 | 0 | + | + | (+) |

WHERE DO WE GO FROM HERE?

- Re-evaluate
 - Is it really a U?
 - Is there another antibody present?
- What other options do I have?



Plasma vs. Red blood cells
– Test additional cells -Phenotype

ADDITIONAL TESTING

- We tested an additional panel of U- cells
 - 7 out of 9 were positive
 - Unable to use for rule-outs
- Stop and look at information:
 - What can we rule out?
 - Are there any clues from the information we have?
- Noticed something strange...

ANOTHER LOOK



| | | Rh | | | | | MNSs | | | | Kell | | Duffy | | Kidd | | Results |
|---|-------|----|---|---|---|---|------|---|---|---|------|---|-----------------|-----------------|-----------------|-----------------|------------------|
| | | D | C | E | c | e | M | N | S | s | K | k | Fy ^a | Fy ^b | Jk ^a | Jk ^b | PEG IAT |
| 1 | U- | + | 0 | 0 | + | + | + | + | 0 | 0 | 0 | + | 0 | 0 | + | + | (+) |
| 2 | U var | 0 | 0 | 0 | + | + | 0 | + | 0 | 0 | 0 | + | 0 | 0 | + | + | (0) [✓] |
| 3 | U- | + | 0 | 0 | + | + | + | + | 0 | 0 | 0 | + | 0 | + | + | 0 | (+) |
| 4 | U- | 0 | 0 | 0 | + | + | 0 | + | 0 | 0 | 0 | + | 0 | 0 | + | 0 | (0) [✓] |
| 5 | U- | + | 0 | 0 | + | + | 0 | + | 0 | 0 | 0 | + | 0 | 0 | + | + | (+) |

WAIT, WHAT?....

- Patient is group AB, Rh positive
 - Retest Rh
 - Patient is Rh positive
- Tested additional U-negative cells that were also D-negative
 - All cells tested were negative
- Not good...



PARTIAL D TESTING

| Kit ID | Weak D Type 1 and 2 | DII & DNU | DIII | DIV | DV | DCS | DVI | DVII | DOL | DFR | DMH | DAR | DAR-E | DHK & DAU-R | DBT | Ro ^{Har} | Test Result | | |
|--------|---------------------|-----------|------|-----|-----|-----|-----|------|-----|-----|-----|-----|-------|-------------|-----|-------------------|-------------|-----------|---------|
| | | | | | | | | | | | | | | | | | Pos Cont. | Neg Cont. | Patient |
| A | + | + | + | + | +/0 | + | 0 | + | + | + | + | + | 0 | 0 | 0 | (+)/0 | 4+ | 0 ✓ | (0) ✓ |
| B | + | + | + | 0 | + | + | + | + | + | + | + | + | + | + | 0 | 0 | 4+ | 0 ✓ | (0) ✓ |
| C | (+)/0 | + | + | 0 | 0 | + | 0 | + | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | 2+ | 0 ✓ | (0) ✓ |
| D | + | + | + | + | + | + | 0 | + | + | + | + | + | + | + | 0 | 0 | 4+ | 0 ✓ | 3+ |
| E | + | + | + | 0 | 0 | + | 0 | + | + | + | + | 0 | 0 | 0 | 0 | 0 | 4+ | 0 ✓ | (0) ✓ |
| F | + | + | + | 0 | + | + | + | + | + | + | + | + | + | + | 0 | 0 | 3+ | 0 ✓ | (0) ✓ |
| G | + | + | + | 0 | + | + | + | + | + | + | + | + | + | + | 0 | 0 | 3+ | 0 ✓ | (0) ✓ |
| H | + | 0 | + | 0 | + | + | + | + | + | + | + | + | + | +/0 | 0 | 0 | 3+ | 0 ✓ | (0) ✓ |
| I | (+)/0 | + | + | 0 | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3+ | 0 ✓ | (0) ✓ |
| J | + | + | + | + | + | + | 0 | 0 | 0 | 0 | (+) | 0 | (+) | + | + | 0 | 4+ | 0 ✓ | 4+ |
| K | + | + | + | + | + | + | 0 | + | + | + | + | + | + | 0 | 0 | 0 | 4+ | 0 ✓ | 3+ |
| L | + | + | + | + | + | 0 | 0 | + | + | 0 | + | + | 0 | 0 | + | 0 | 4+ | 0 ✓ | 3+ |

ARE WE DONE YET?

- Rule-outs
 - Not able to rule out E, K, Fy^b, Jk^b
- Adsorptions
 - Ficin treated adsorbing cells
 - Remove anti-U

ANTI-U FICIN ADSORPTIONS

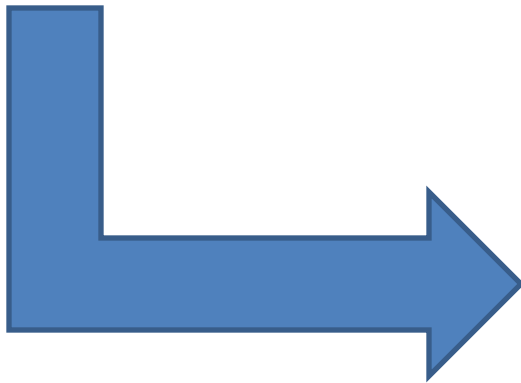
| | | Rh | | | | | MNSs | | | | Kell | | | | P | Duffy | | Kidd | | | Results |
|---|-------------------------------|----|---|---|---|---|------|---|---|---|------|---|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------------|
| | | D | C | E | c | e | M | N | S | s | K | k | Kp ^b | Js ^b | P ₁ | Fy ^a | Fy ^b | Jk ^a | Jk ^b | Xg ^a | Ficin Treated PEG IAT |
| 1 | r''r | 0 | 0 | + | + | + | + | + | + | + | + | + | + | 0 | + | + | + | + | + | + | 2+ ^S |
| 2 | r''r | 0 | 0 | + | + | + | + | + | 0 | + | + | 0 | + | + | + | + | 0 | 0 | + | + | 2+ ^S |
| 3 | r'r | 0 | + | 0 | + | + | + | 0 | + | 0 | 0 | + | + | + | + | + | 0 | 0 | + | + | 2+ ^S |
| 4 | R ₂ R ₂ | + | 0 | + | + | 0 | + | 0 | + | + | 0 | + | + | + | + | + | + | + | + | + | 2+ ^S |
| 5 | rr | 0 | 0 | 0 | + | + | + | 0 | 0 | + | 0 | + | + | + | + | + | 0 | + | 0 | 0 | 2+ ^S |
| 6 | rr | 0 | 0 | 0 | + | + | + | + | + | + | 0 | + | + | 0 | + | + | 0 | + | 0 | + | 2+ ^S |

ANTI-U UNTREATED ADSORPTIONS

| | | Rh | | | | | MNSs | | | | Kell | | | | P | Duffy | | Kidd | | Results | | |
|---|-------------------------------|----|---|---|---|---|------|---|---|---|------|---|-----------------|-----------------|----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------------|-------------------|
| | | D | C | E | c | e | M | N | S | s | K | k | Kp ^b | Js ^b | P ₁ | Fy ^a | Fy ^b | Jk ^a | Jk ^b | Xg ^a | Ficin Treated PEG IAT | Untreated PEG IAT |
| 1 | r''r | 0 | 0 | + | + | + | + | + | + | + | + | + | + | 0 | + | + | + | + | + | + | 2+ ^S | (0) [✓] |
| 2 | r''r | 0 | 0 | + | + | + | + | + | 0 | + | + | 0 | + | + | + | 0 | 0 | 0 | + | + | 2+ ^S | (0) [✓] |
| 3 | r'r | 0 | + | 0 | + | + | + | 0 | + | 0 | 0 | + | + | + | + | 0 | 0 | 0 | + | + | 2+ ^S | (0) [✓] |
| 4 | R ₂ R ₂ | + | 0 | + | + | 0 | + | 0 | + | + | 0 | + | + | + | + | + | + | + | + | + | 2+ ^S | 2+ |
| 5 | rr | 0 | 0 | 0 | + | + | + | 0 | 0 | + | 0 | + | + | + | + | 0 | 0 | + | 0 | 0 | 2+ ^S | (0) [✓] |
| 6 | rr | 0 | 0 | 0 | + | + | + | + | + | + | 0 | + | + | 0 | + | 0 | 0 | + | 0 | + | 2+ ^S | (0) [✓] |

DAY 2

- Finally something works!!!
- Just 1 more thing...
- Hospital update
- NYBC



THE REPORT

- Genotype
 - Confirmed patient is U-negative
- Serology
 - Confirmed anti-D and anti-U
 - Confirmed Partial DI Va
 - Same adsorption problems

ADDITIONAL FINDINGS

- NYBC continued investigating...
 - Further Rh molecular testing
 - New RHD allele
 - Other altered RH alleles
 - Predicted Phenotype after findings

WHAT TO TRANSFUSE

- What antibodies does that patient actually have?
- What antibodies could the patient possibly form?
- Weighing our options



Questions





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