

ABID CASE #5 , ANSWERS

Case study by Jim Perkins, M.D. (© 2006)



1. What is the probable identity of this antibody?

Alloanti-Fy^a

2. Comment on the varying strength of reactivity of the serum in the initial panel and in the various test systems used.

The initial panel suggests a dosage effect, but it is not consistent; grading the reactions of very weak gel antibodies is subjective. The PEG/tube method is often considered the "gold standard" technique for warm-reactive IgG antibodies, but in this case the antibody fails to react with a single dose Fy^a cell using PEG enhancement.

3. Is any further workup needed to prove it?

PEG is not a very good technique to rule out cold-reactive antibodies, so it might be more accurate to rule anti-N out in gel.

4. What is the probable immunizing stimulus in this case?

The patient was transfused 10 months earlier. Of note, however, this patient is 101 years old, and older individuals are less likely to form new antibodies. Therefore, this antibody is likely to have formed after an anamnestic response, possibly with primary immunization occurring during a remote pregnancy.

5. Does this antibody cause hemolytic transfusion reactions? *Yes*

Hemolytic disease of the fetus and newborn? Yes (usually not severe)

6. How would we select compatible RBCs for this patient? What percent of donors is expected to be compatible with this recipient?

We would select group O, Rh positive, Fy^a negative RBCs, compatible by an antiglobulin crossmatch. Thirty four per cent (34%) of European-Americans (E-A) and 90% of African-Americans (A-A) are expected to be compatible.

7. What is the biochemical nature of the antigen? Which cells in the panels above likely come from African-American (A-A) donors? (Review the relevant blood group system, including disease associations and racial differences in antigen prevalence for this and other antigens.)

*Duffy antigens are carried on a multipass membrane glycoprotein called the Duffy Antigen Receptor for Cytokines (DARC). DARC binds inflammatory cytokines including IL-8, MCP-1, RANTES, but when present on inflammatory cells does not activate the usual signaling sequences. DARC also acts as the RBC invasion site for *P. vivax*, and the Fy^{a,b} phenotype confers resistance to infection with this parasite. This phenotype is encoded by a variant of the Fy^b allele which is not expressed in RBC precursors, but because it is expressed in other cells individuals homozygous for the allele (Fy^{a,b} phenotype) do not make anti-Fy^b. They can, however, make anti-Fy³ which reacts with all RBCs carrying Fy^a or Fy^b. Duffy a and b antigens are destroyed by the proteolytic enzymes ficin and papain. The two proteins differ by a single amino acid.*

*Blood groups that whose presence or absence suggest that a donor might be of African descent include: Fy^{a&b} (both absent in 68% of A-A), S (31% prevalence in A-A, 55% in E-A), K (2% prevalence in A-A, 9% in E-A) & Js^a (0.01% prevalence in E-A, 20% in A-A), Le^b (72 % prevalence in E-A, 55% in A-A), V (30% of A-A are V+), Ro (45% allele frequency in A-A), & Jk^b (49% prevalence in A-A, 74% in E-A). (All phenotype frequencies are from Reid & Lomas-Francis, *The Blood Group Antigen Facts Book*, 2nd Ed., 2004)*