INDIAN IMMUNOHEMATOLOGY INITIATIVE
CASE OF THE MONTH: APRIL 2008

Answers:

1. What is the probable identity of this antibody?

   Anti-E

2. Is any further workup needed to prove it?

   No; if you include the reactive antibody screening cell and the cell that reacted in the second (PEG/tube) panel there are 3 E positive cells reactive, 3 non-reactive cells, the patient is E negative, and the appropriate antibodies are ruled out (anti-D, -C, -c, -e, -K, -k, -Fy^a, -Fy^b, -Jk^a, -Jk^b, -Le^a, -Le^b, -S, -s, -M, -N, -P1)

3. Why doesn't the antibody react with all cells carrying the corresponding antigen? What is this phenomenon called?

   This patient's serum reacts only with cells carrying a "double-dose" (homozygous expression) of the E antigen. Such cells are more easily agglutinated by weak anti-E sera because there is a greater density of the E antigen on their surface. This is called the "dosage phenomenon" and the serum is said to "show dosage".

4. Does this antibody cause hemolytic transfusion reactions? (Hint: if the patient was transfused 3 weeks earlier, why isn't there a mixed field typing for C and/or E showing transfused cells of the common Rh phenotypes R1 or R2.)

   Anti-E causes both immediate and delayed hemolytic transfusion reactions (IHTRs and DHTRs respectively), and in our laboratory is a common cause of DHTRs. In fact, this patient appears to have had a DHTR. The fact that the antibody detection test was negative 3 weeks ago but is now positive due to anti-E suggests that at least one of the transfused units was E positive and caused an anamnestic reaction producing anti-E. But the DAT and E antigen typing test are both negative, suggesting that the E positive transfused cells are no longer circulating and have been eliminated.

5. Does this antibody cause hemolytic disease of the newborn?

   Yes.

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

   We would select group B or O, Rh positive, E negative RBCs, compatible in an indirect antiglobulin test crossmatch. Overall 70% of European donors are E negative.

7. What is the biochemical nature and the genetics of the antigen corresponding to the antibody identified in this patient? (Review the outline of the features of the relevant blood group system.) What is the patient's most likely genotype for the relevant blood group system?

The E antigen is carried by a multi-pass membrane protein which also carries the C/c polymorphism, so these traits demonstrate "linkage disequilibrium". Expression of E and antithetical e-determining alleles is co-dominant. All Rh antigens are protease resistant, and agglutination by Rh antibodies is typically enhanced by protease treatment of RBCs. The RhD and RhCE proteins are associated with the RBC "skeleton", and Rh_{null} *cells lacking both proteins have abnormal morphology. They also appear to function as pores of transporters, possibly for* CO_2 *or ammonium ion.*