Antibody Identification - Anti-D and Anti-N Case Study

A prenatal sample is received from a 27 year old Caucasian female pregnant with her third child. Her history includes a large fetomaternal hemorrhage during the delivery of her second child; the infant was Rh(D) positive. Rh(D) negative women with a large fetomaternal hemorrhage (FMH) from an Rh(D) positive fetus are at risk for anti-D alloimmunization if they do not receive adequate Rh immune globulin (RhIG). The patient was previously typed as AB Rh(D) negative.

Prenatal Results

<table>
<thead>
<tr>
<th>ABO/Rh</th>
<th>Anti-A</th>
<th>Anti-B</th>
<th>Anti-D</th>
<th>Rh Control</th>
<th>A1 cells</th>
<th>B cells</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4+</td>
<td>4+</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2+</td>
</tr>
</tbody>
</table>

Additional Tests

<table>
<thead>
<tr>
<th>DAT</th>
<th>All Auto Controls</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Participants were asked to perform an antibody screen and/or identification.

Expected Results

The patient’s serum, Sample EDU-01, is group AB with anti-D and anti-N. To resolve the ABO discrepancy caused by the reverse grouping reaction of the prenatal serum with B cells, additional testing was performed using B Rh(D) negative cells that were also N negative. This test showed the patient lacked anti-B antibodies.

The panel results for this sample can be seen on page 3.

Anti-D Discussion

The Rh blood group is one of the most complex blood groups known in humans. From its discovery 70 years ago, it has become second in importance only to the ABO blood group in the field of transfusion medicine. The significance of the Rh blood group is related to the fact that the Rh antigens are highly immunogenic, with the D antigen being the most potent. The D antigen has remained of primary importance in obstetrics as the main cause of hemolytic disease of the fetus and newborn (HDFN) since anti-D antibodies readily transverse the placenta and the D antigen is well developed on fetal cells. Titration studies of any antibody capable of causing HDFN are utilized in conjunction with other diagnostic findings to monitor fetal health and development. For titration study results to be meaningful, the test must be performed at each testing exactly the same way with cells of the same phenotype. Each laboratory should develop its own critical titer levels; however, generally a titer above 16 is considered clinically significant.
Anti-N Discussion

Following the discovery of the ABO blood group system, Landsteiner and Levine deliberately attempted to discover more blood group antigens by immunizing rabbits with human red blood cells. In 1927, MNS was the second blood group system to be discovered. The M and N antigens were identified first; it was another 20 years before the S and s antigens were named. Now, forty-six antigens are included in this blood group system. The MN antigens are carried on sugar-bearing proteins called glycophorins which lie in the red cell membrane; M and N are found on glycophorin A. The antigens can be detected early in fetal development and are fully developed at birth. MN antigens are degraded by the enzymes ficin, papain, bromelin, trypsin, and pronase. The frequency of the N antigen in Caucasians is 72% and among Blacks is 75%.

Antibodies against N are not common. Anti-N made by individuals who type M+N-S+ or s+ is typically a cold reactive IgM or IgG saline agglutinin that does not bind complement, demonstrates dosage and does not react with enzyme treated cells. Anti-N antibodies can generally be ignored in transfusion practice and, if room temperature incubation is eliminated from compatibility testing and screening for antibodies, they will not be detected. When N antibodies active at 37°C are encountered, antigen-negative or red cells compatible by an indirect antiglobulin test should be provided. These antibodies have been implicated in only very rare cases of HDNF. In a prenatal sample that shows reactivity at 37°C, some facilities may choose to perform additional testing to determine if the antibody is IgG in nature.

Since this antibody commonly reacts at RT, it may cause difficulties in the reverse grouping of ABO typing. Once the antibody has been identified, the discrepancy can be resolved by testing A and/or B cells that are negative for N.

Reference


This case study and antibody discussion was provided by Hemo bioscience (www.hemobioscience.com), the manufacturer of these Blood Bank proficiency samples.
# Data-Cyte® Plus
## Reagent Red Blood Cells 3±1%