PREVALENCE OF RBC ALLOANTIBODIES IN BLOOD DONORS

Monika Paroder-Belenitsky1,2, Anna Birbraer1, Shiraz Rehmani1, Vijay Nandi1, Bruce S. Sachais1 and Connie M. Westhoff1

1New York Blood Center, New York, NY, USA
2Mantlefiere Medical Center, Dept of Pathology, Bronx, NY, USA

OBJECTIVES

The prevalence of RBC alloimmunization has been reported in blood recipients but little data exists on the prevalence of alloimmunization to RBC antigens in healthy donors. The aim of the current study was to determine the prevalence and specificities RBC antibodies in blood donors and to quantify antibodies by gender, age and race, and to assess antibody evanescence.

METHODS

Blood center records were searched from 1999-2017 to identify donors with at least one (+) antibody screen. Hemetrics®, an enterprise data management and analytics platform, was used to access NYBC’s core data repository, retrieve and analyze results. Chi-square statistical tests of association, Cochran-Armitage test for trend, and pairwise, two-sided multiple comparison testing was used as appropriate. All statistical testing was set at alpha=0.05 and all statistical tests were conducted in SAS software version 9.4 (SAS Institute Inc., Cary, NC, USA).

RESULTS

7,036,353 antibody screens were performed on 1,500,756 donors
Donor follow up ranged from 0 - 6,564 d; median of 364 d

A.

B.

Table 1. Ab prevalence donors with (+) antibody screen/ID, % donors with specified Ab, calculated as the # donors with Ab ID/total # donors with (+) screen/ID.

<table>
<thead>
<tr>
<th>Ab ID</th>
<th>% donors with (+) screen/ID</th>
<th>% Ab screens</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-D</td>
<td>1196 (24.1%)</td>
<td>4.0%</td>
</tr>
<tr>
<td>Anti-E</td>
<td>803 (16.2%)</td>
<td>2.7%</td>
</tr>
<tr>
<td>Anti-K</td>
<td>727 (14.6%)</td>
<td>2.3%</td>
</tr>
<tr>
<td>Anti-C</td>
<td>308 (6.2%)</td>
<td>1.0%</td>
</tr>
<tr>
<td>Anti-M</td>
<td>242 (4.9%)</td>
<td>0.8%</td>
</tr>
<tr>
<td>Anti-c</td>
<td>213 (4.3%)</td>
<td>0.7%</td>
</tr>
<tr>
<td>Anti-Fya</td>
<td>164 (3.3%)</td>
<td>0.5%</td>
</tr>
<tr>
<td>Anti-Jka</td>
<td>151 (3.1%)</td>
<td>0.5%</td>
</tr>
</tbody>
</table>

Figure 2. Ab prevalence in donors. % of donors with specified Ab ID/ total # donors with (+) screen performed.

Figure 3. Gender-specific Ab prevalence in donors with (+) antibody screen/ID, % F donors (top) or male donors (bottom) with Ab ID, calculated as # F M with Ab ID/total F M donors with (+) screens.

Figure 4. Association of age with antibody prevalence. P-value Cochran-Armitage test for trend Anti-D: 0.001 (F), 0.030 (M), Anti-K: 0.001 (F), 0.027 (M)

Figure 5. (A) schematic of time to evanescence (B) box plots showing median time to evanescence. Lower hinge represents the 25th %tile, upper hinge the 75th %tile, horizontal line within box represents median.

SUMMARY AND DISCUSSION

This study is a retrospective analysis using our Hemetrics® data analytics platform to evaluate the prevalence of RBC antibodies in blood donors.

A (+) screen with concurrent antibody identification was recorded in 0.512% of female and 0.16% of all male donors tested. Of donors with positive screens and IDs on record, 75% were females and 25% were males.

Anti-D was the most common antibody specificity overall (24% all screens). Antibodies to blood group antigens vary in relative frequencies according to gender; the most frequent specificity in females was Anti-D (29%) and in males was anti-K (18%).

Antibody evanescence ensued in 62% of antibodies which became undetectable, with a median time to evanescence of 302 days (~10 months). This still may underestimate the actual rate, as NYBC donors with >2 positive screens on record were deferred until 2013. For the same reason, it is plausible that the time to evanescence is an over-estimation. Our study did not allow for correlations with transfusion and pregnancy data or with donor immune status, which would help to further delineate evanescence and reappearance of red cell antibodies.

Evanescence can hinder accurate pre-transfusion testing, underscoring the need for access to transfusion records and antibody workups across hospital systems in order to ensure safest blood transfusion practice. Considerations of extended antigen typing and matching for both donors and recipients may be warranted.