Anti-HLA/PA-Antibodies in Female Blood Donors depend on Gravidity Status and remain live-long

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Background: Anti-HLA-Antibodies (aHLAAB), Anti-Neutrophil-Antibodies (aNAB) and Anti-Platelet-Antibodies (aPAB) are leading causes of Febrile, Non-Hemolytic Transfusion Reaction (FNHTR), Transfusion Related Acute Lung Injury (TRALI) and Post-Transfusion Purpura (PTP). Antibody (AB) formation (sensitization) occurs following pregnancy and transfusion. To prevent TRALI, FNHTR and PTP, the Swiss Transfusion Service SRC prohibits the use of female Fresh Frozen Plasma for transfusion. However, female platelet donations are still needed to assure platelet concentrates supply. Sensitive methods for screening of blood donors (BD) at risk for aHLAAB, aNAB and aPAB and information on AB persistence are expected to allow rational donor selection preventing loss of valuable donor resources.

Methods: To evaluate prevalence, test sensitivity and persistence of sensitization in female BD (fBD), we recruited 1019 fBD into a screening protocol applying two different test platforms (Capture-P assay by Immucor and anti-HLA/HPA-ELISA assay by DGTI). All study probands provided individual pregnancy data as well as informed consent by written questionnaire.

Results: 476 fBDs had gravidity status (G, including aborts) of 1 – 6 past pregnancies in their lifetime (posG) and 543 fBDs were nulligravida (negG) and served as control group. By capture assays, 1.2% of all fBDs were positive for any kind of HLA/HNA/HPA AB. In contrast, by ELISA 8.3% of fBDs were found AB positive. However, 21.6% of fBDs with posG tested AB positive by ELISA, while only 3.4% of fBD with negG tested AB positive. In women with posG the odds ratio (OR) for AB formation increased by G: G0: OR = 1, G1: 9.1 (2.6-31.5), G2: 14.8 (5.1-42.8), G3: 26.5 (8.4-83.8), G≥4: 58.9 (15.7-221.8). Over time, the frequency of sensitized fBD with posG is independent on the time elapsed since last pregnancy, suggesting live-long persistence of AB.

Conclusions: 1. Screening of anti-HLA/HPA AB is performed most efficiently by ELISA as compared to capture assays. **2.** 21% of fBD with posG carry pregnancy induced AB. The risk of AB formation increases according to G of fBD. **3.** Pregnancy induced AB last for at least 25 years post gravidity and may be present during complete donor career. **4.** The OR for anti-HLA Class II AB correlates with G. In contrast, the risk for anti-HLA Class I AB formation is not affected by G of fBD.