PREVALENCE, SPECIFICITY AND TITRE OF ALLO-ANTIBODIES IN VOLUNTARY BLOOD DONATIONS AND IN THE CORRESPONDING BLOOD PRODUCTS

Beat M. Frey, Edi Matheis, Anna E. Böhlen-Bodmer, Barbara Grossrieder
Stiftung Zürcher Blutspendedienst SRK, CH-8001 Zürich (www.zhbsd.ch)

Background: Eligibility criteria for blood donation by individuals carrying red blood cell antibodies (AB) are heavily debated by national and international authorities. By now, data on prevalence, specificity and titre of AB among voluntary blood donors are scarce and data on residual alloAB in the yielded blood products (BP) due not exist. Therefore, variable roles concerning donor eligibility criteria are in place. In Switzerland, allosensitized blood donors (alloBD) may be accepted to donate red blood cell concentrates (RCC) exclusively, depending on AB titre in the donor's plasma. However, recovered fresh frozen plasma (FFP) of such donors will be discarded. Alternatively, alloBD may be excluded from blood donation at first place. We investigated prevalence, specificity and titre of alloAB in Swiss BD and in the donated BP from allosensitized BD.

Methods: By reviewing of all the electronic donor files dated from 1.1.1990 to 30.11.2004, BD presenting with positive antibody screening test (AST) were identified and used to assess the study objectives. From 1.1.2001 to 1.11.2004, BP (RCC and Fresh Frozen Plasma, FFP) of AST+ BD were examined in parallel with the donor's predonation blood sample for alloAB specificity and titre. Until 1999, AST was performed on BD having had transfusions (t), pregnancy (p), surgical interventions (s) or other reasons to raise alloAB. Starting on 1.1.2000, all BD were assessed by AST at least once, independent of individual risk situation. Age corrected prevalence of alloAB were calculated based on BD population's age structure in 1995.

Results

Table 1: Characteristics of Swiss blood donors with red blood cell antibodies

	Men (%)	Women (%)	Overall (%)
No of donors assessed	32'198 (57.4)	23'959 (42.6)	56'148 (100)
Donors with positive AST	84 (0.15)	222 (0.40)	306 (0.55)
Donors with allo AB	81 (0.14)	216 (0.38)	297 (0.53)
Donors with auto AB	3 (0.005)	6 (0.01)	9 (0.01)
Median age (range) of AST+ BD	41 (18-70)	34 (18-70)	36 (18-70)

Figure 1: Prevalence of Swiss blood donors with red blood cell antibodies

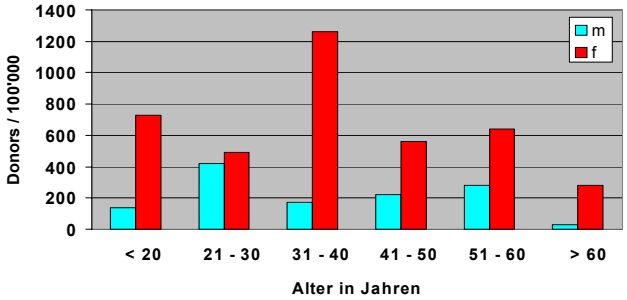


Table 2: Prevalence (No/100'000) of BD with induced and naturally occurring red blood cell antibodies by age and sex

	Age group					
	<20	21 - 30	31 - 40	41 - 50	51 - 60	>60
alloABind						
Males	0	245	102	224	278	28
Females	146	425	1072	461	570	194
alloABnat						
Males	150	180	70	0	0	0
Females	580	70	190	90	70	80

alloABind: induced alloAB, occurring after pregnancy, transfusion, surgery
alloABnat: alloAB occurring without known sensitizing event

Figure 2: Specificity of *alloABind* and *alloABnat*

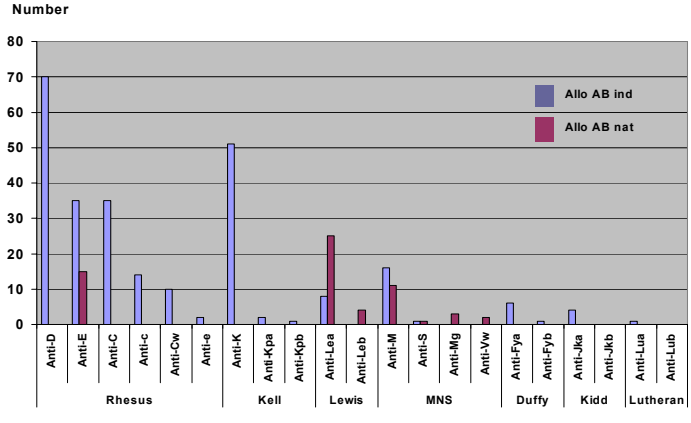


Figure 3: Residual alloAB of RCC by AB titre in donated whole blood

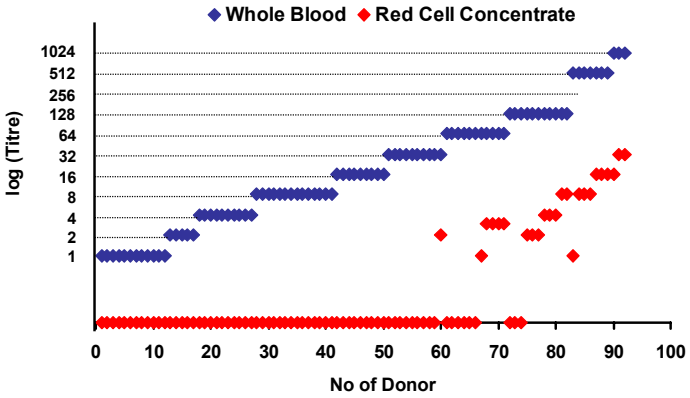
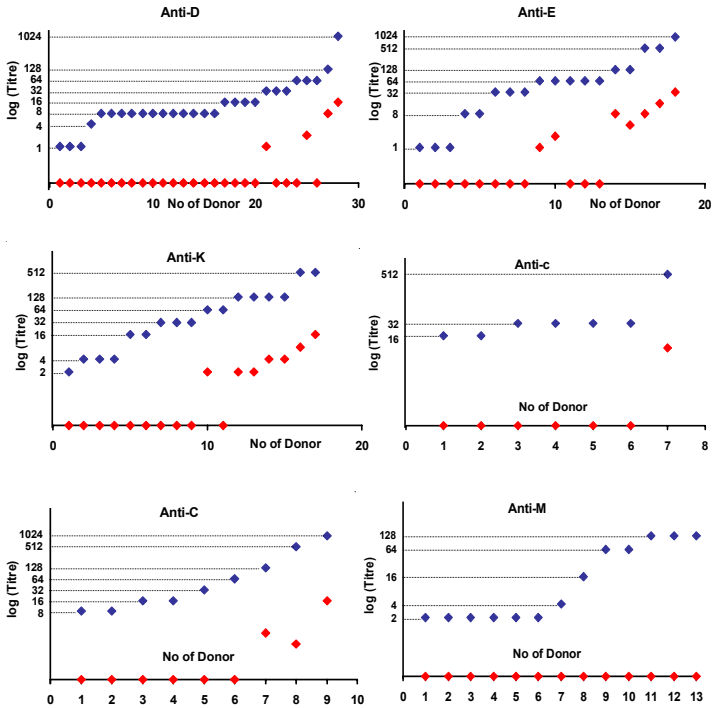


Figure 4: Residual alloAB titre in RCC by AB specificity



Conclusions

1. **Female BD >30 yrs of age carry alloAB in ~1%. In contrast, male BD are carriers in 0.15%. Overall, 0.55% of Swiss BD carry alloAB**
2. **Nearly 50% of alloAB are induced by pregnancy and are observed mainly in the age group of 31-40 yrs (prevalence 1.26%)**
3. ***alloABind* usally have Rh or K specificities, *alloABnat* often show non-Rh specificities. *alloABind* are of higher titre as compared to *alloABnat* (data not shown)**
4. **AlloAB of titre <32 will be completely depleted by the manufacturing procedure of RCC. However, alloAB of titre ≥32 will show up in the RCC with reduced titre by 5-6 titre levels (data not shown). In contrast, IgM alloAB (anit-M) will be depleted completely during RCC manufacturing procedure independent of titre in donated WB**
5. **There is no detectable depletion of alloAB by the manufacturing procedure of FFP (data not shown)**