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Retrospective analysis of stored umbilical cord blood units — ethnicity, quality parameters and HLA

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Background & Aim: Precious Cells International Ltd. (Precious Cells) is the first public/private hybrid bank established in UK. Since May 2014, Precious Cells has been collecting altruistic umbilical cord blood (UCB) donations at six UK hospitals focusing its collections in ethnically diverse areas. A total of 402 donations have been successfully processed and stored to May-17. To assess this approach, a retrospective analysis of ethnicity data was carried out. 65% (n=263) of stored donations both parents were of the same ethnic group, 34% were classified as white northern European, 24% as South Asian, 17% as Sub-Saharan African and 13% eastern European based on Precious Cells' ethnic group classification. 32% of donations were from parents of different ethnicities. Focusing on a subset of 150 donations successfully stored during 2015-2017, the average weight of UCB units at collection was 158 g and the CD45+ cell count was 2.2×10^9 . Post-processing, the UCB unit average CD45+ cell count was 1.28×10^9 , the average CD34+ cell count was 6.42×10^6 and the average viability was 97.4%. Of these 150 units, 131 met the 6th edition NetCord-FACT requirements for these parameters.

Results: These 150 donations were ABO typed and HLA typed by NGS for HLA class I (HLA-A, -B, -C—exons 2 and 3) and HLA class II (HLA-DRB1/3/4/5, -DQB1 and -DPB1—exon 2). Using 2013 NMDP US donor registry haplotype reference data, the number of Precious Cells UCBs matching the top three haplotypes at HLA-A, -B, -C, -DRB1 and -DQB1 was determined for African American (AFA), Hispanic (HIS), Caucasoid (CAU), Asian or Pacific Islander (API) groups. 12 (8%) UCB units carried the HLA-A*01:01, -B*08:01, -C*07:01, -DRB1*03:01, -DQB1*02:01 haplotype and 6 (4%) carried the HLA-A*03:01, -B*07:02, -C*07:02, -DRB1*15:01, -DQB1*06:02 haplotype; these haplotypes were common to AFA, CAU and HIS groups. There were 3 (2%) UCB units carrying the HLA-A*29:02, -B*44:03, -C*16:01, -DRB1*07:01, -DQB1*02:01 haplotype, which was common to the CAU and HIS groups. There were only two UCB units matching a single API haplotype (HLA-A*30:01, -B*13:02, -C*06:02, DRB1*07:01, DQB1*02:01) and there was only a single UCB donation with a HLA-A, -B, -C match for the top API haplotype (HLA-A*33:03G, -B*58:01G, -C*03:02, -DRB1*03:01, -DQB1*02:01). There were no homozygous UCB units at HLA-A, -B, -C, -DRB1 and -DQB1 among the 150 HLA typed UCB units.

Discussion: This review shows that Precious Cells' UCB units are of high quality and carry common AFA, HIS and CAU haplotypes at five loci potentially meeting need of these populations. However, in spite of 24% of donors being South Asian the number of UCB units carrying API haplotypes is limited. This may be due to differences in ethnicities included in the API group in the US compared to the UK. A review using a UK data set should be carried out to address these potential differences in order to determine the performance of the focused collection approach.

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