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IDENTIFICATION AND MOLECULAR CHARACTERIZATION OF HY AND JOA NEGATIVE BLOOD DONORS IN SOUTHERN USA

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Background: The Dombrock blood group system consists of two antithetical (Doa /Dob) and three high-incidence antigens Gregory (Gya), Holley (Hy), and Joseph (Joa). Hy and Joa have an unusual phenotypic relationship in that all Hy- RBCs are also Jo(a-). To date this phenotype has only been found in Blacks. Three single nucleotide polymorphisms (snps) are associated with these antigens: G323T (Holley), C350T (Joseph), and A793G (Doa /Dob). Thus, the following haplotypes have been described: TCG (HY), GTA (JO), GCA (DOA) and GCG (DOB).

Materials and Methods: Serum from a patient with anti-Hy was optimally diluted to detect both Hy- or Joa- samples and used to screen 2,080 random Black donors by the Ortho MTS Gel system. Undiluted anti-Hy and anti-Joa were used by tube method to confirm negative results and Doa and Dob expression were studied by serological methods. Genomic DNA was prepared and the Hy, Joa and Doa/Dob snps were determined by PCR-RFLP using BsaJ I, Xcm I and BseR I, respectively

Results: Three Hy- and 17 Jo(a-) donors were identified among the 2,080 samples tested for a phenotype frequency of 0.14% and 0.8%, respectively. In addition, four samples typed as weak positive for Joa using undiluted serum. The patient with anti-Hya and all three Hy- donors were confirmed as HY/HY by DNA typing. However, only two Jo(a-) donors typed homozygous for JO, ten were HY/JO, one was HY/DOB and three gave no PCR product. Red cells from all of the HY/JO donors typed as Do(aw+bw+). An additional donor appeared to have the HY/JO genotype but the JO mutation occurred with a DOB (GTG) rather than the usual DOA (GTA) allele.

Conclusion: In previous reports, no Hy- were found in 1,121 Black donors from the Midwest and no Jo(a-) were detected in 7,689 random Black donors from New York. The increased prevalence of Hy- and Jo(a-) Black donors from the Southern USA is in contrast to these studies and may relate to differences in their African origins. Furthermore, we found twice as many HY/JO donors than previously reported as well as a JO mutation carried on a DOB allelic background. The mechanism for non-expression of Joa in these donors is under further study.