

Linkage disequilibria between 6 STR loci situated in the HLA region on chromosome 6

S. Wenda ^{*}, E.M. Dauber, G. Dorner, R.B.K. Reisacher,
B. Glock, W.R. Mayr

Division of Blood Group Serology, Medical University of Vienna, Austria

Abstract. Linkage disequilibria between 3 STR loci (C1_4_4, C2_4_4 and C3_3_6) situated in the HLA class I region and 3 STR loci (D6S389, D6S1051 and D6S2822) located in the HLA class II region on chromosome 6 were investigated. In the class I region, some significant linkage disequilibria could be observed but not in the class II region. © 2005 Elsevier B.V. All rights reserved.

Keywords: Linkage disequilibrium; STR; HLA class I region; HLA class II region

1. Introduction

Linkage disequilibria between 3 STR loci (C1_4_4, C2_4_4 and C3_3_6) located within the HLA class I region and 3 STR loci (D6S389, D6S1051 and D6S2822) situated in the HLA class II region on chromosome 6 (6p21.3) were investigated in order to get further genetic information about the HLA region.

2. Materials and methods

DNA was extracted from peripheral blood lymphocytes (QIAamp[®] DNA Blood Mini Kit, Qiagen, Valencia, USA) of 71 Austrian Caucosoid families including 272 individuals. We investigated 3 tetranucleotide repeat loci D6S389 [1], D6S1051 (GenBank G08553) and D6S2822 (M2_4_25) [2] situated in the HLA class II region (D6S2822 located between HLA-DQ and DP; D6S1051 4 cM centromeric of HLA-DP and D6S389 1.3 cM centromeric of D6S1051), as well as 2 tetranucleotide repeat loci, C1_4_4 (D6S2931) and

^{*} Corresponding author. Tel.: +43 1 40400 5320; fax: +43 1 40400 5321.

E-mail address: sabine.wenda@meduniwien.ac.at (S. Wenda).

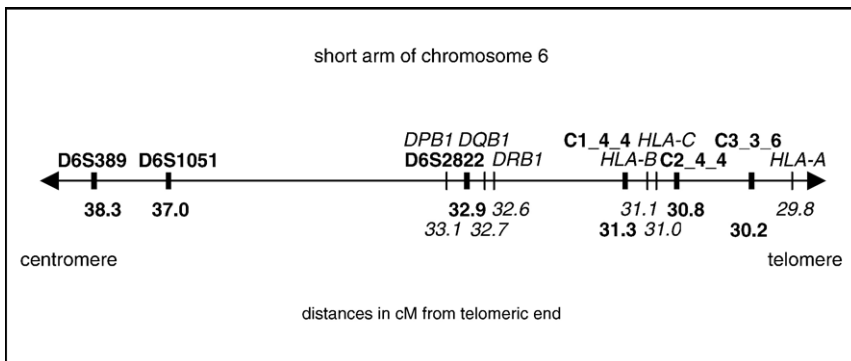


Fig. 1. Localization of the 6 STR loci on chromosome 6.

C2_4_4 (D6S2939), and 1 trinucleotide repeat locus C3_3_6 (D6S2906) located in the HLA class I region [1] (C3_3_6 0.4 cM and C2_4_4 1 cM centromeric of HLA-A, respectively; C1_4_4 0.2 cM centromeric of HLA-B). The localization of these loci is shown in Fig. 1. DNA typing was performed as described elsewhere [3,4].

3. Results and discussion

284 haplotypes (HLA class I+II and 6 STR loci) could be defined. The analysis of the linkage disequilibrium between alleles of the 3 STR loci located in the HLA class I region (C1_4_4, C2_4_4, C3_3_6) showed several significant values (the p values have been corrected by multiplying them with the number of comparisons made). The results are shown in Table 1. No linkage disequilibria could be found between alleles of the 3 STR loci next to the HLA class II region (D6S389, D6S1051, D6S2822) and between alleles of these 3 loci and the loci situated in the HLA class I region.

Within the HLA class I STRs, only one haplotype with a significant 3-locus-disequilibrium could be observed: C1_4_4*10, C2_4_4*9, C3_3_6*12. These 3 alleles are situated on the common Caucasoid superhaplotype HLA-A1,B8,Cw7,DR3.

Table 1
Significant linkage disequilibria

C1_4_4	C2_4_4	C3_3_6	χ^2	Significance, corrected p values
	*20	*17	34.88	$p < 0.001$
	*9	*12	27.36	$p < 0.001$
*10	*9		153.13	$p < 0.001$
*12	*11		83.29	$p < 0.001$
*16	*16		25.74	$p < 0.001$
*7	*16		24.86	$p < 0.001$
*8	*10		23.24	$p < 0.001$
*19	*10		20.85	$p < 0.001$
*10	*10		19.27	$p < 0.01$
*18	*17		18.69	$p < 0.01$
*7	*17		14.29	$p < 0.05$
*10		*12	31.34	$p < 0.001$
*19		*9	15.05	$p < 0.05$

The absence of a high degree of linkage disequilibrium between the alleles of the HLA STRs is probably due to the fact that the STR loci, in contrast to the phenotypically expressed HLA alleles, are not subjected to selective forces. The lack of significant disequilibria between the HLA class II STRs is also caused by the higher physical distance between the loci.

References

- [1] A. Foissac, M. Salhi, A. Cambon-Thomsen, Microsatellites in the HLA region: 1999 update, *Tissue Antigens* 55 (2000) 477–509.
- [2] Y. Matsuzaka, et al., New polymorphic microsatellite markers in the human MHC class II region, *Tissue Antigens* 56 (2000) 492–500.
- [3] R.B.K. Reisacher, et al., Short tandem repeat polymorphisms across the HLA-complex: sequence and population data of D6S389 and D6S1051, *Int. Congr. Ser.* 1261 (2004) 236–238.
- [4] S. Wenda, et al., Multiplex PCR investigation of the STR loci C1_4_4, C2_4_4 and C3_3_6 in the HLA class I region, *Int. Congr. Ser.* 1261 (2004) 188–190.