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Allele frequency distributions of four STR loci vWA, TH01, TPOX and F13A01 in three Asian populations (Japanese, Bangladeshis and Indonesians)

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Abstract

Allele frequencies for four short tandem repeat (STR) loci vWA, TH01, TPOX and F13A01 were determined in three Asian populations, Japanese, Bangladeshis and Indonesians. No deviations from Hardy–Weinberg equilibrium were observed in the three populations for all loci. The combined power of discrimination (PD) for the four loci was 0.9995 in Japanese, 0.99991 in Bangladeshis and 0.9998 in Indonesians.

Keywords: STR; Population data; Japanese; Bangladeshi; Indonesian

1. Introduction

The short tandem repeat (STR) loci vWA [1], TH01 [2], TPOX [3] and F13A01 [4] are useful in forensic identification and paternity testing due to their highly polymorphic

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Table 1
Allele frequency distributions of vWA, TH01, TPOX and F13A01 in Japanese, Bangladeshis and Indonesians

Allele	Japanese				Bangladeshi				Indonesian			
	vWA	TH01	TPOX	F13A01	vWA	TH01	TPOX	F13A01	vWA	TH01	TPOX	F13A01
3.2				0.305				0.126				0.192
4				0.130				0.076				0.120
5				0.035				0.396				0.274
6		0.250		0.525		0.255		0.223		0.082		0.380
7		0.288				0.162	0.004	0.112		0.375		0.029
8		0.053	0.458			0.155	0.374	0.004		0.096	0.529	0.005
9		0.388	0.108			0.309	0.162			0.255	0.130	
9.3		0.020				0.104				0.067		
10		0.003	0.020			0.014	0.065			0.125	0.019	
11			0.373				0.371				0.317	
12			0.043				0.022				0.005	
13							0.004	0.011	0.005			
14	0.213				0.162			0.011	0.202			
15	0.018			0.003	0.058			0.022	0.029			
16	0.178			0.003	0.180			0.014	0.149			
17	0.283				0.277			0.007	0.260			
18	0.193				0.201				0.231			
19	0.098				0.112				0.096			
20	0.018				0.011				0.024			
21	0.003								0.005			
HWE (*P*)												
ET	0.140	0.136	0.690	0.697	0.419	0.263	0.807	0.661	0.155	0.114	0.999	0.591
LRT	0.139	0.252	0.887	0.766	0.402	0.226	0.757	0.806	0.276	0.070	0.977	0.590

nature. We report here the allele frequencies for these four STR loci in three Asian populations—Japanese, Bangladeshis and Indonesians.

2. Materials and methods

Blood samples were collected from 200 unrelated Japanese individuals, 139 unrelated Bangladeshi individuals and 104 unrelated Indonesian individuals.

Table 2
Statistical parameters of forensic importance for the four STR loci in Japanese

Locus	H_{obs}	$H_{exp} \pm$ S.E.	MEC	PIC	PD
vWA	0.765	0.796 ± 0.028	0.599	0.764	0.928
TH01	0.730	0.700 ± 0.032	0.441	0.644	0.838
TPOX	0.640	0.637 ± 0.034	0.369	0.568	0.797
F13A01	0.600	0.613 ± 0.034	0.349	0.548	0.782
Combined			0.908		0.9995

Table 3
Statistical parameters of forensic importance for the four STR loci in Bangladeshis

Locus	H_{obs}	$H_{exp} \pm$ S.E.	MEC	PIC	PD
vWA	0.864	0.809 ± 0.033	0.619	0.783	0.928
TH01	0.827	0.779 ± 0.035	0.565	0.715	0.901
TPOX	0.705	0.693 ± 0.039	0.434	0.639	0.845
F13A01	0.712	0.759 ± 0.036	0.556	0.728	0.914
Combined			0.958		0.99991

DNA was extracted by the phenol–chloroform method. The four loci, vWA, TH01, TPOX and F13A01, were typed using the GenePrint™ STR System (Promega) according to the technical manual (Part # TMD004).

3. Results and discussion

The genotypes and allele frequencies for the four STR loci in Japanese, Bangladeshis and Indonesians are shown in Table 1. The genotype frequency distribution for each locus in Japanese, Bangladeshis and Indonesians did not deviate from Hardy–Weinberg equilibrium (HWE) expectations based on the exact test (ET) and the likelihood ratio test (LRT). There were no significant differences in the distribution of vWA among Japanese, Bangladeshis and Indonesians (Japanese and Bangladeshis: $P = 0.082$, Japanese and Indonesians: $P = 0.895$, Bangladeshis and Indonesians: $P = 0.534$), but there were significant differences in the distribution of TH01, TPOX and F13A01 ($P < 0.001$). With regard to the locus F13A01, larger alleles (13–17) were observed at a considerable frequency in Bangladeshis, while they were rare in Japanese and none were observed in Indonesians. Moreover, in Bangladeshis the most common allele at locus F13A01 was allele 5, while in Japanese and Indonesians allele 6 was the most common.

Tables 2, 3 and 4 show the statistical parameters of forensic importance such as observed/expected heterozygosity (H_{obs} and H_{exp}), mean exclusion chance (MEC), polymorphic information content (PIC) and power of discrimination (PD) of the four STR loci in Japanese, Bangladeshis and Indonesians. The PD of F13A01 for Bangladeshis (0.914) was significantly higher than those for Japanese (0.782) and Indonesians (0.882). The combined PD for the four loci was 0.9995 in Japanese, 0.99991 in Bangladeshis and 0.9998 in Indonesians.

Table 4
Statistical parameters of forensic importance for the four STR loci in Indonesians

Locus	H_{obs}	$H_{exp} \pm$ S.E.	MEC	PIC	PD
vWA	0.693	0.805 ± 0.039	0.615	0.777	0.939
TH01	0.778	0.758 ± 0.042	0.549	0.723	0.901
TPOX	0.606	0.603 ± 0.048	0.331	0.533	0.776
F13A01	0.711	0.729 ± 0.044	0.491	0.684	0.882
Combined			0.941		0.9998

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