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FOR THE RECORD

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Population Data for Four Population Groups from the United States for the Eleven Y-Chromosome STR Loci Recommended by SWGDAM

POPULATIONS: Caucasian (*n* = 1243), African American (*n* = 1605), Hispanic (*n* = 454), and Native American (*n* = 104).

KEYWORDS: forensic science, Y-chromosome, short tandem repeats, DNA typing, human identification, population genetics, multiplex, polymerase chain reaction, Y-STR, Y-PLEX, DYS392, DYS390, DYS385a/b, DYS393, DYS389I, DYS391, DYS389II, DYS19, DYS439, DYS438

The samples for database studies were obtained from unrelated anonymous males from the indicated population groups residing in the United States of America (USA). The samples were collected as buccal swabs, blood drawn in EDTA vacutainer tubes, or blood stain cards. The DNA was extracted either by Chelex® method (1) or by using the QIAamp® MiniKit (Qiagen, Valencia, CA) following the recommended procedures. The Y-PLEX™6, Y-PLEX™5, and Y-PLEX™12 systems (ReliaGene Technologies Inc., New Orleans, LA) were used for the amplification of extracted DNA. The PCRs and the analysis of amplified product were performed as recommended and described by the manufacturer (2–4).

Gene diversity at each locus, the number of haplotypes and haplotype diversity were calculated using a program developed by Chakraborty and Lee (http://cgi.uc.edu/download/haplo).

The Scientific Working Group on DNA Analysis Methods (SWGDAM) has identified a set of 11 short-tandem loci on the Y-chromosome (Y-STR) DYS19, DYS389I, DYS389II, DYS390, DYS391, DYS392, DYS393, DYS385a/b, DYS438, and DYS439 for forensic DNA analysis in the USA (5). Of these, the Y-PLEX™6 system enables amplification of the seven loci DYS19, DYS389II, DYS390, DYS391, DYS393, and DYS385a/b and in combination with the Y-PLEX™5 system all 11 loci can be typed (2,3). The haplotypes for the 11 Y-STR loci recommended were generated either by using Y-PLEX™6 and Y-PLEX™5 systems or the Y-PLEX™12 system (a kit that enables simultaneous amplification of the 11 recommended Y-STR loci). A total of 4623 samples comprising Caucasian (*n* = 1826), African American (*n* = 2239), Hispanic (*n* = 454), and Native American (*n* = 104)

TABLE 1—*Allele frequencies of the 11 Y-STR loci in Caucasian, African American, Hispanic, and Native American population groups.*

		Caucasian (*n* = 1243)		African American (*n* = 1605)		Hispanic (*n* = 454)		Native American (*n* = 104)	
Locus	Allele	Count	%	Count	%	Count	%	Count	%
DYS393	11	3	0.241	3	0.187	4	0.881		
	12	107	8.608	65	4.050	66	14.537	22	21.154
	13	1001	80.531	911	56.760	333	73.348	65	62.500
	14	111	8.930	427	26.604	41	9.031	15	14.423
	15	20	1.609	191	11.900	9	1.982	2	1.923
	16	1	0.080	7	0.436	1	0.220		
	17			1	0.062				
DYS19	12			2	0.125	1	0.221		
	13	61	4.911	30	1.869	88	19.469	22	21.154
	14	860	69.243	419	26.106	244	53.982	58	55.769
	15	225	18.116	613	38.193	84	18.584	17	16.346
	16	74	5.958	292	18.193	24	5.310	6	5.769
	17	22	1.771	248	15.452	11	2.434	1	0.962
	18			1	0.062				
DYS389II	25	1	0.080						
	27	15	1.207	13	0.810	6	1.322	1	0.962
	28	202	16.251	140	8.723	47	10.352	17	16.346
	29	597	48.029	384	23.925	180	39.648	44	42.308
	30	300	24.135	557	34.704	144	31.718	36	34.615
	31	107	8.608	389	24.237	53	11.674	6	5.769
	32	18	1.448	105	6.542	24	5.286		
	33	3	0.241	17	1.059				
DYS390	20			28	1.745				
	21	19	1.529	887	55.265	26	5.727	3	2.885
	22	146	11.746	146	9.097	34	7.489	1	0.962
	23	320	25.744	169	10.530	114	25.110	48	46.154
	24	570	45.857	265	16.511	231	50.881	37	35.577
	25	177	14.240	98	6.106	46	10.132	15	14.423
	26	9	0.724	11	0.685	3	0.661		
	27	2	0.161	1	0.062				

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TABLE 1—*Continued.*

Locus	Allele	Caucasian ($n = 1243$)		African American ($n = 1605$)		Hispanic ($n = 454$)		Native American ($n = 104$)	
		Count	%	Count	%	Count	%	Count	%
DYS391	7					1	0.220		
	8			2	0.125				
	9	28	2.253	24	1.495	24	5.286	16	15.385
	10	579	46.581	1131	70.467	242	53.304	50	48.077
	11	616	49.558	424	26.417	181	39.868	36	34.615
	12	19	1.529	23	1.433	6	1.322	1	0.962
	13	1	0.080	1	0.062			1	0.962
DYS385a/b	8			1	0.031				
	9	2	0.080	6	0.187				
	10	31	1.247	9	0.280	8	0.881	1	0.481
	10.2			1	0.031				
	11	762	30.652	355	11.059	223	24.559	45	21.635
	12	139	5.591	68	2.118	38	4.185	6	2.885
	13	264	10.619	109	3.396	85	9.361	13	6.250
	13.2			5	0.156				
	14	830	33.387	447	13.925	242	26.652	48	23.077
	15	252	10.137	409	12.741	112	12.335	42	20.192
	15.3	1	0.040						
	16	99	3.982	613	19.097	72	7.930	18	8.654
	16.3	2	0.080			4	0.441		
	17	47	1.891	588	18.318	49	5.396	22	10.577
	18	40	1.609	391	12.181	45	4.956	6	2.885
	19	13	0.523	172	5.358	24	2.643	4	1.923
	20	4	0.161	27	0.841	6	0.661	3	1.442
	21			9	0.280				
DYS389I	11	3	0.241	18	1.121	7	1.542	1	0.962
	12	238	19.147	259	16.137	57	12.555	17	16.346
	13	806	64.843	1062	66.168	281	61.894	70	67.308
	14	186	14.964	261	16.262	107	23.568	16	15.385
	15	10	0.805	5	0.312	2	0.441		
DYS439	9	1	0.080						
	10	77	6.195	36	2.243	30	6.608	2	1.923
	11	443	35.640	492	30.654	135	29.736	41	39.423
	12	565	45.455	794	49.470	217	47.797	50	48.077
	13	140	11.263	257	16.012	69	15.198	11	10.577
	14	17	1.368	26	1.620	3	0.661		
DYS438	8	2	0.161	21	1.308	1	0.220		
	9	49	3.942	25	1.558	47	10.352	4	3.846
	10	316	25.422	181	11.277	98	21.586	22	21.154
	11	112	9.010	998	62.181	78	17.181	33	31.731
	12	732	58.890	371	23.115	225	49.559	42	40.385
	13	31	2.494	9	0.561	5	1.101	3	2.885
	14	1	0.080						
DYS392	8			1	0.062			1	0.962
	9			2	0.125	1	0.220		
	10	4	0.322	6	0.374	2	0.441		
	11	394	31.698	1166	72.648	143	31.498	24	23.077
	12	51	4.103	76	4.735	20	4.405	4	3.846
	13	684	55.028	299	18.629	231	50.881	42	40.385
	14	101	8.126	51	3.178	33	7.269	29	27.885
	15	9	0.724	3	0.187	15	3.304	3	2.885
	16			1	0.062	7	0.542	1	0.962
	17					1	0.220		
	18					1	0.220		

TABLE 2—*Observed haplotype diversity and haplotype match probability for the 11 Y-STR loci.*

Population	Haplotype Diversity (h)	Haplotype Match Probability
Caucasian ($n = 1243$)	0.996493	0.003507
African American ($n = 1605$)	0.999291	0.000709
Hispanic ($n = 454$)	0.997851	0.002149
Native American ($n = 104$)	0.993465	0.006535

TABLE 3—*Observed most frequent haplotypes for the 11 Y-STR loci.*

Population Group	Haplotype (DYS393, DYS19, DYS389II, DYS390, DYS391, DYS385a/b, DYS389I, DYS439, DYS438, and DYS392)	n
Caucasian ($n = 1243$)	13, 14, 29, 24, 11, 11–14, 13, 12, 12, 13	42
	13, 14, 29, 24, 10, 11–14, 13, 12, 12, 13	29
	13, 14, 29, 23, 11, 11–14, 13, 12, 12, 13	26
	13, 14, 28, 22, 10, 13–14, 12, 11, 10, 11	18
	13, 14, 29, 24, 11, 11–14, 13, 11, 12, 13	16
	13, 14, 29, 24, 11, 11–14, 13, 13, 12, 13	15
	13, 14, 29, 24, 11, 11–15, 13, 12, 12, 13	14
	13, 14, 29, 25, 11, 11–13, 13, 12, 12, 14	13
	13, 14, 30, 24, 11, 11–14, 13, 12, 12, 13	12
	13, 14, 30, 24, 11, 11–14, 14, 12, 12, 13	10
	13, 14, 30, 24, 10, 11–14, 13, 12, 12, 13	10
	13, 14, 29, 25, 11, 11–14, 13, 12, 12, 13	8
	13, 14, 29, 24, 11, 11–15, 13, 11, 12, 13	8
	13, 14, 29, 24, 10, 11–15, 13, 12, 12, 13	8
	13, 14, 29, 23, 11, 11–14, 13, 13, 12, 13	8
	13, 14, 29, 23, 10, 11–14, 13, 12, 12, 13	7
African American ($n = 1605$)	13, 14, 29, 24, 11, 11–14, 13, 12, 12, 13	15
	13, 15, 31, 21, 10, 16–17, 13, 12, 11, 11	11
	13, 15, 31, 21, 11, 16–17, 13, 11, 11, 11	10
	13, 14, 29, 23, 11, 11–14, 13, 12, 12, 13	9
	13, 14, 29, 24, 10, 11–14, 13, 12, 12, 13	8
	13, 15, 31, 21, 10, 16–17, 13, 11, 11, 11	8
	13, 14, 28, 25, 11, 14–14, 12, 11, 11, 11	7
	13, 17, 30, 21, 10, 17–18, 13, 12, 11, 11	7
	13, 17, 30, 21, 10, 18–18, 13, 12, 11, 11	7
	14, 15, 30, 21, 10, 15–16, 13, 12, 11, 11	7
	14, 17, 30, 21, 10, 17–18, 13, 12, 11, 11	7
	15, 17, 31, 21, 10, 17–19, 14, 12, 11, 11	7
	14, 15, 30, 21, 10, 15–18, 13, 12, 11, 11	6
	13, 14, 29, 24, 11, 11–14, 13, 11, 12, 13	6
	13, 14, 29, 25, 11, 11–13, 13, 12, 12, 14	6
Hispanic ($n = 454$)	13, 14, 29, 24, 11, 11–14, 13, 12, 12, 13	12
	13, 14, 29, 24, 11, 11–14, 13, 11, 12, 13	10
	13, 13, 30, 24, 9, 13–14, 14, 10, 10, 11	7
	13, 14, 30, 24, 11, 11–14, 13, 12, 12, 13	7
	13, 14, 30, 24, 11, 11–14, 14, 12, 12, 13	5
	13, 14, 29, 24, 11, 11–14, 13, 13, 12, 13	5
	13, 14, 29, 24, 10, 11–14, 13, 12, 12, 13	4
	13, 13, 32, 23, 10, 15–19, 13, 13, 10, 11	4
	13, 14, 28, 22, 10, 13–14, 12, 11, 10, 11	3
	12, 14, 29, 24, 11, 11–14, 13, 12, 12, 13	3
	13, 14, 30, 24, 11, 11–14, 14, 11, 12, 13	3
	13, 14, 29, 24, 11, 11–15, 13, 12, 12, 13	3
	13, 14, 30, 25, 11, 11–14, 14, 12, 12, 13	3
	13, 15, 29, 24, 11, 11–14, 13, 11, 12, 14	3
Native American ($n = 104$)	13, 14, 29, 23, 11, 11–14, 13, 12, 12, 13	7
	14, 14, 28, 25, 10, 16–17, 12, 12, 11, 14	4
	14, 14, 28, 25, 10, 16–17, 12, 11, 11, 14	2
	13, 14, 29, 24, 11, 11–14, 13, 11, 12, 13	2
	13, 14, 30, 24, 10, 11–14, 14, 11, 13, 13	2
	13, 14, 30, 24, 11, 11–14, 13, 12, 12, 13	2
	12, 15, 29, 23, 9, 14–15, 13, 11, 10, 12	2
	12, 15, 29, 23, 9, 15–15, 13, 11, 10, 11	2
	12, 16, 29, 23, 9, 15–15, 13, 11, 10, 11	2
	13, 13, 30, 23, 10, 17–18, 13, 12, 11, 14	2

were profiled for the seven Y-STR loci using the Y-PLEX$^{\text{TM}}$6 system. Of these, 3406 samples comprising Caucasian ($n = 1243$), African American ($n = 1605$), Hispanic ($n = 454$), and Native American ($n = 104$) were profiled for the 11 Y-STR loci recommended by SWGDAM. The analysis of the data for seven Y-STR loci typed using the Y-PLEX$^{\text{TM}}$6 is not included herein, because the conclusions are similar to that previously reported (2,6,7). Table 1 summarizes the allele frequency distribution for alleles in each locus in Caucasian, African American, Hispanic, and Native American population groups. In general, gene diversity was high-

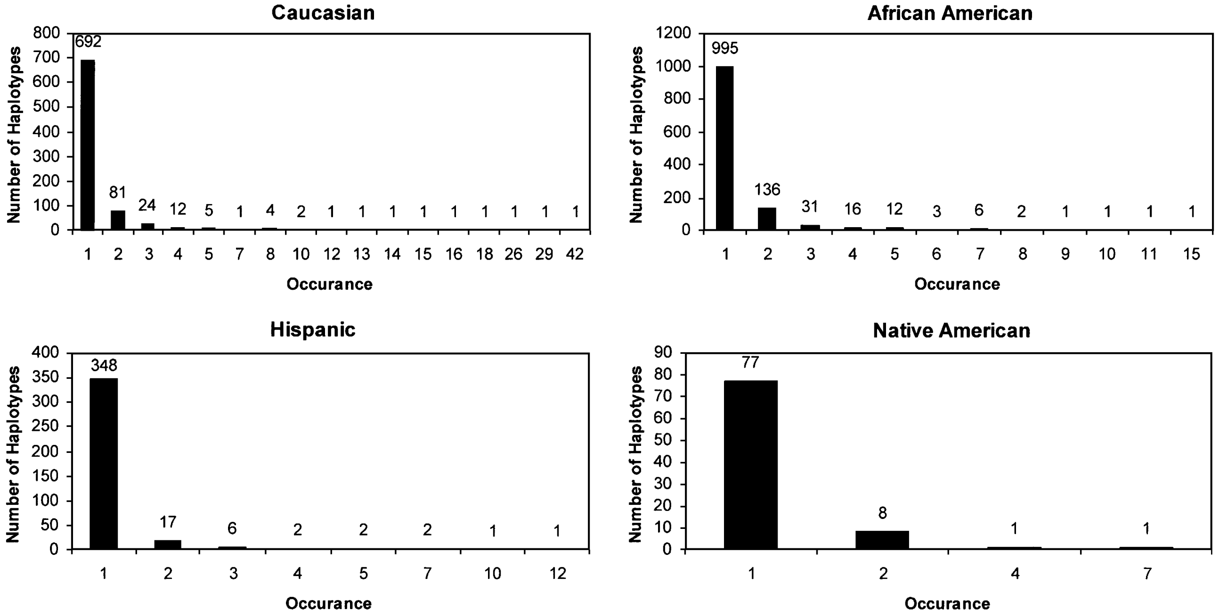

FIG. 1—*Haplotype frequency distribution for 11 Y-STR loci in the Caucasian (n = 1243), African American (n = 1605), Hispanic (n = 454), and Native American (n = 104) population groups.*

est for the locus DYS385a/b in all four population groups. The observed allele frequencies were similar to the database studies reported for these loci in populations of same anthropological affinity (for references see (5,6)). The haplotype genetic diversity and haplotype match probability computed for the four population groups are presented in Table 2. These values for Caucasian and African American population groups are very similar to those reported by Sinha et al. (8). The data reveal that 692 of 1243 Caucasian, 995 of 1605 African American, 348 of 454 Hispanic, and 77 of 104 Native American haplotypes were observed only once in each population group (Fig. 1). The most frequent haplotypes and their frequency distribution in Caucasian, African American, Hispanic, and Native American population groups are presented in Table 3.

Access to the data: www.reliagene.com or via electronic mail to the corresponding author.

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