

FOR THE RECORD

Heather Miller Coyle,¹ Ph.D.; Bruce Budowle,² Ph.D.; Michael T. Bourke,¹ Ph.D.; Eric Carita,¹ B.S.; Jennifer L. Hintz,¹ M.S.; Carll Ladd,¹ Ph.D.; Christine Roy,¹ M.S.; Nicholas C. S. Yang,¹ M.F.S.; Timothy Palmbach,¹ Esq.; and Henry C. Lee,¹ Ph.D.

Population Data for Seven Y-Chromosome STR Loci from Three Different Population Groups Residing in Connecticut*

Population: We have analyzed the distribution of allele frequencies at seven Y-chromosomal short tandem repeat (STR) loci (DYS393, DYS19, DYS389II, DYS390, DYS391, DYS385) among three racial groups residing in Connecticut [Caucasian ($n = 243$), African American ($n = 267$) and Hispanic ($n = 277$)].

KEYWORDS: forensic science, Y-chromosome, short tandem repeats, DNA typing, human identification, Y-STR, Y-PLEX, DYS393, DYS19, DYS389II, DYS390, DYS391, DYS385

The samples for database studies were obtained from unrelated males from the indicated population groups residing in the state of Connecticut and were anonymized before analysis. The DNA from blood samples was extracted using the QIAamp® DNA blood MiniKit (Qiagen, Valencia, CA) following the recommended procedures. The quantity of human DNA was determined by slot blot hybridization using the QuantiBlot kit (Applied Biosystems, Foster City, CA) and following the manufacturer's recommended protocols. The Y-PLEX™6 system (ReliaGene Technologies, Inc., New Orleans, LA) was used for the amplification of the Y short tandem repeat (STR) loci. PCR amplification and the analysis of amplified product were performed as recommended by the manufacturer and as described in Sinha et al. (1).

The Y-PLEX™6 system enables amplification of seven Y-chromosome STR loci: DYS393, DYS19, DYS389II, DYS390, DYS391, and DYS385 (1). The locus DYS385 yields a two-allele profile, which is a result of gene duplication and mutation (2). Thus, the DYS385 locus is equivalent to two loci. Table 1 summarizes the allele frequency distribution for each locus in the Caucasian, African American, and Hispanic populations represented in

Connecticut. The microvariant alleles were confirmed by repeat amplification. Three individuals from the Hispanic population group carried a two-allele profile (Alleles 15 and 16) at the DYS19 locus (data not shown). One individual from the Caucasian population group had a three-allele profile (Alleles 11, 12, 14) at the DYS385 locus (data not shown). The observed allele frequencies were similar to previous studies conducted using the Y-PLEX™6 kit (1) and to studies reported for these loci in populations of the same anthropological affinity (3–5). The genetic diversity and random match probability computed for the three population groups are presented in Table 2. These values for the Caucasian and African American population groups are similar to those reported by Sinha et al. (1). There were 159, 198, and 149 unique haplotypes in the Caucasian, African American, and Hispanic populations, respectively. The most frequent haplotypes observed in the Caucasian, African American, and Hispanic population samples are presented in Table 3.

The complete data set can be accessed at www.reliagene.com and is also available upon request via e-mail at c4ensic@yahoo.com.

Acknowledgments

The authors wish to thank Dr. Jaiprakash Shewale for his assistance and review of the data. Thank you also to Suzanne Neylon and Michelle Irvin for their assistance on this project.

¹ State of Connecticut Department of Public Safety, Division of Scientific Services, Forensic Science Laboratory, 278 Colony Street, Meriden, CT.

² FBI, Laboratory Division, 935 Pennsylvania Ave. N.W., Washington, DC.

* A portion of this work was presented at the American Academy of Forensic Sciences Annual Meeting, February 11–16, 2002, in Atlanta, GA.

TABLE 1—Allele frequency distribution for the Y-PLEX™6 STR loci in Caucasian, African American, and Hispanic population samples.

Locus	Allele	Caucasian Observed		African American Observed		Hispanic Observed	
		Num	%	Num	%	Num	%
DYS393	12	30	12.35	13	4.87	31	11.91
	13	175	72.02	134	50.19	202	72.92
	14	31	12.76	89	33.33	34	12.27
	15	7	2.88	29	10.86	10	3.61
	16			1	0.38		
	17			1	0.38		
	DYS19*	12	1	0.41			
13		23	9.47	8	3.00	46	16.79
14		144	59.26	58	21.72	153	55.84
14.2		1	0.41				
15		43	17.70	96	35.96	45	16.42
16		21	8.64	61	22.85	16	5.84
17		10	4.12	43	16.11	14	5.11
18				1	0.38		
DYS389II	26					1	0.36
	27	3	1.24	5	1.87	5	1.81
	28	38	15.64	21	7.87	30	10.83
	29	104	42.80	53	19.85	94	33.94
	30	70	28.81	102	38.20	99	35.74
	31	19	7.82	63	23.60	37	13.36
	32	9	3.70	19	7.12	11	3.97
	33			4	1.50		
DYS390	20			2	0.75	1	0.36
	21	2	0.82	156	58.43	37	13.36
	22	30	12.35	30	11.24	33	11.91
	23	68	27.98	21	7.87	59	21.30
	24	100	41.15	32	11.99	121	43.68
	25	41	16.87	23	8.61	24	8.66
	26	2	0.82	3	1.12	1	0.36
	27					1	0.36
DYS391	8					1	0.36
	9	10	4.12	10	3.75	30	10.83
	10	112	46.09	198	74.16	145	52.35
	11	115	47.33	59	22.10	97	35.02
	12	5	2.06			4	1.44
	13	1	0.41				
DYS385†	8	1	0.21				
	10	5	1.03	2	0.38	5	0.90
	11	130	26.86	37	6.93	100	18.05
	12	35	7.23	9	1.69	28	5.05
	13	42	8.68	16	3.00	90	16.25
	13.2						
	14	150	30.99	70	13.11	146	26.35
	15	51	10.54	76	14.23	55	9.93
	16	32	6.61	118	22.10	44	7.94
	17	20	4.13	115	21.54	33	5.96
	17.3	1	0.21				
	18	11	2.27	58	10.86	39	7.04
	18.3	1	0.21			1	0.18
	19	4	0.83	26	4.87	11	1.99
20	1	0.21	6	1.12	2	0.36	

*Three individuals were deleted from the table at the *DYS19* locus because they contain two-allele patterns.

†One individual was deleted from the table at the *DYS385* locus because a three-allele pattern was present.

TABLE 2—Observed genetic diversity and random match probability for the Y-Plex™6 system.

Population	Genetic Diversity, h	Random Match Probability
Caucasian ($n = 243$)	0.9942	0.0099
African American ($n = 267$)	0.9984	0.0053
Hispanic ($n = 277$)	0.9913	0.0123

TABLE 3—Observed number of the most frequent haplotypes using the Y-PLEX™6 kit for each population group.

Caucasian (n = 243)		African American (n = 267)		Hispanic (n = 277)	
Y Haplotype (DYS393, DYS19, DYS389II, DYS390, DYS391, DYS385)	n	Y haplotype (DYS393, DYS19, DYS389II, DYS390, DYS391, DYS385)	n	Y Haplotype (DYS393, DYS19, DYS389II, DYS390, DYS391, DYS385)	n
13-14-29-24-11-11,14	15	13-15-31-21-10-16,17	5	13-14-29-24-11-11,14	16
13-14-29-23-11-11,14	9	13-14-29-24-10-11,14	4	13-13-30-24-9-13,14	13
13-14-29-24-10-11,14	4	13-14-28-25-10-14,14	3	13-14-30-24-11-11,14	8
13-14-29-25-11-11,13	4	13-14-28-25-11-14,14	3	13-14-29-23-11-11,14	6
13-14-28-22-10-13,14	3	13-15-30-21-10-16,17	3	13-14-31-21-11-16,18	6
13-14-28-22-10-14,14	3	14-15-30-21-10-16,17	3	13-14-29-23-10-14,14	5
13-14-28-23-10-14,14	3	14-16-30-21-10-16,17	3	13-14-30-25-10-11,14	5
13-14-29-23-10-11,14	3	14-17-30-21-10-18,18	3	12-14-29-22-10-13,18	4
13-14-30-24-11-11,14	3			13-14-29-23-11-15,16	4
13-15-29-24-11-11,15	3			13-14-28-22-10-13,14	4
				13-14-29-24-10-11,15	4
				13-14-29-22-10-13,15	3
				13-14-29-24-10-11,14	3
				13-15-28-24-9-13,17	3
				13-13-31-24-9-13-14	3
				13-14-29-22-10-13-14	3

References

1. Sinha SK, Arcot S, Richey SL, Budowle B, Chakraborty R, Jones MD, et al. Development and validation of a multiplexed Y-chromosome STR genotyping system, Y-PLEX™6, for forensic casework. *J Forensic Sci* 2003;48:in press.
2. Schneider PM, Meuser S, Waiyawuth W, Seo Y, Rittner C. Tandem repeat structure of the duplicated Y-chromosomal STR locus DYS385 and frequency studies in the German and three Asian populations. *Forensic Sci Int* 1998;97:61–70.
3. Roewer L, Krawczak M, Willuweit S, Nagy M, Alves C, Amorim A, et al. On line reference database of European Y-chromosomal short tandem repeat (STR) haplotypes. *Forensic Sci Int* 2001;118:106–13.
4. Redd AJ, Clifford SL, Stoneking M. Multiplex DNA typing of short-tandem-repeat loci on the Y chromosome. *Biol Chem* 1997;378:923–7.
5. Lessig R, Edelman J, Krawczak M. Population genetics of Y-chromosomal microsatellites in Baltic males. *Forensic Sci Int* 2001;118:153–7.

Additional information and reprint requests:

Heather Miller Coyle, Ph.D.
 State of Connecticut Department of Public Safety
 Division of Scientific Services
 Forensic Science Laboratory
 278 Colony Street
 Meriden, CT 06451
 Phone: 203-639-6400
 Fax: 203-639-6485
 E-mail: c4ensic@yahoo.com