

## FOR THE RECORD

William E. Frank,<sup>1</sup> M.S.; Heather C. Ralph,<sup>1</sup> B.S.; and Mohammad A. Tahir,<sup>2</sup> Ph.D.

# Y Chromosome STR Haplotypes and Allele Frequencies in a Southern Indian Male Population

**POPULATION:** Southern Indian ( $n = 123$ ).

**KEYWORDS:** forensic science, DNA typing, short tandem repeats, population genetics, DYS19, DYS389I, DYS389II, DYS390, DYS391, DYS392, DYS393, DYS385, DYS438, DYS439, DYS437, Southern India population

Bloodstain samples were obtained from 123 Southern Indian males. DNA was extracted from each sample using a standard SDS/proteinase K extraction buffer. Each sample was isolated using Microcon™ 100 filters (Millipore Corporation, Bedford, MA) following phenol–chloroform–isoamyl alcohol treatment of the DNA extract and quantified using the Quantifiler™ Human real time PCR assay (Applied Biosystems, Foster City, CA). Approximately 0.75 ng of DNA was targeted for amplification of the Y-short tandem repeats (STR) loci DYS19, DYS389I, DYS389II, DYS390, DYS391, DYS392, DYS393, DYS385, DYS438, DYS439, and DYS437 using the PowerPlex® Y PCR Amplification Kit (1) according to manufacturers' recommendations (2) (Promega Corporation, Madison, WI). PCR products generated were analyzed on the ABI PRISM™ 310 Genetic Analyzer (Applied Biosystems). Haplotypes were defined using Genescan™ and Genotyper™ software (Applied Biosystems) and the PowerTyperY macro from PowerTyper Release 2 (Promega Corporation).

Allele frequencies, gene diversity, and haplotype diversity values (3) are presented in Table 1. Diversity values correspond to expected heterozygosity values for autosomal STR loci and provide the probability that two randomly chosen haplotypes will be different. Average autosomal STR gene diversity values were calculated at 0.811 and 0.804 for Caucasian and African American populations using data reported in the Applied Biosystems AmpFISTR Profiler Plus population study (4). Southern Indian population data collected in this study identified an average Y-STR gene diversity value of 0.657 (Table 1).

The haplotype diversity value identified for the Southern Indian population in this study was 0.9989 with 118 unique haplotypes identified in a population of 123. One gene duplication event was identified at the DYS385 locus in this population (Table 1). Haplotype data generated in this study has been included in the YHRD-Y Chromosome Haplotype Reference Database and is presented in the same format (5). This data along with other population groups can be found at <http://www.yhrd.org/index.html>.

TABLE 1—Allele frequencies, gene diversity, and haplotype diversity at 11 Y-STR loci Southern Indian males ( $n = 123$ ).

Locus	Allele	Frequency	Diversity
DYS19	13	0.057	0.618
	14	0.195	
	15	0.569	
	16	0.146	
	17	0.032	
DYS389I	11	0.008	0.619
	12	0.187	
	13	0.536	
	14	0.252	
	15	0.016	
DYS389II	27	0.016	0.789
	28	0.171	
	29	0.268	
	30	0.260	
	31	0.211	
	32	0.065	
	33	0.008	
	34	0.008	
DYS390	21	0.065	0.782
	22	0.284	
	23	0.146	
	24	0.203	
	25	0.276	
	26	0.024	
	27	0.008	
DYS391	9	0.008	0.440
	10	0.691	
	11	0.293	
	12	0.008	
DYS392	9	0.008	0.470
	10	0.065	
	11	0.715	
	12	0.024	
	13	0.049	
DYS393	14	0.122	0.711
	15	0.016	
	11	0.098	
	12	0.284	
	13	0.415	
	14	0.179	
	15	0.024	

<sup>1</sup>Illinois State Police, Research and Development Laboratory, 2060 Hill Meadows Drive, Springfield, IL 62702.

<sup>2</sup>Strand Analytical Laboratory, 5770 Decatur Blvd., Suite #A, Indianapolis, IN 46241.

TABLE 1—continued.

Locus	Allele	Frequency	Diversity		
DYS385	7	0.004	0.869		
	8	0.004			
	9	0.000			
	10	0.008			
	11	0.154			
	12	0.032			
	13	0.134			
	14	0.243			
	15	0.081			
	16	0.109			
	17	0.113			
	18	0.057			
	19	0.036			
	20	0.020			
	21	0.004			
	DYS437	14		0.602	0.535
		15		0.317	
		16		0.081	
	DYS438	8		0.016	0.673
		9		0.260	
10		0.268			
11		0.439			
DYS439	12	0.016	0.726		
	10	0.325			
	11	0.350			
	12	0.195			
	13	0.114			
	14	0.016			

Haplotype diversity = 0.9989.

## References

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3. Nei M. *Molecular evolutionary genetics*. New York: Columbia University Press, 1987.
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5. YHRD STR Database. Berlin: Institute of Legal Medicine, Charité – University Medicine; <http://www.yhrd.org/index.html>.

Additional information and reprint requests:

William E. Frank, M.S.  
Illinois State Police  
Research and Development Laboratory  
2060 Hill Meadows Drive  
Springfield, IL 62702  
E-mail: [william\\_frank@isp.state.il.us](mailto:william_frank@isp.state.il.us)

TABLE 2—Southern Indian haplotype frequency distribution.

Sample ID	Y-STR haplotype										
	DYS19	DYS389I	DYS389II	DYS390	DYS391	DYS392	DYS393	DYS385	DYS438	DYS439	DYS437
136	13	13	28	24	10	13	13	14,16	10	12	15
41	13	13	29	23	11	10	13	14,17	11	10	16
86	13	13	30	22	10	14	13	15,16	11	13	14
150	13	13	30	25	10	13	13	13,17	11	12	15
2	13	13	31	25	10	11	13	16,18	10	13	14
52	13	13	31	25	10	13	13	13,18	11	11	15
32	13	14	31	22	10	15	13	12,16	11	12	15
125	14	12	28	21	10	14	11	14,17	11	12	15
79	14	12	28	22	10	14	11	13,17	10	13	15
131	14	12	28	22	10	14	11	13,17	10	13	15
44	14	12	28	22	10	14	11	13,17	10	13	15
58	14	12	28	22	10	14	11	14,14	10	13	15
54	14	12	28	22	10	14	11	14,16	10	14	15
23	14	12	28	22	11	14	12	14,17	11	12	14
133	14	12	28	23	10	15	11	13,17	10	13	15
22	14	12	28	24	10	11	12	13,16	9	12	15
4	14	12	29	22	10	12	12	14,16	10	12	16
143	14	12	29	22	10	14	11	13,16	10	11	15
149	14	12	30	22	10	14	11	14,18	10	12	15
114	14	13	28	23	10	11	12	16,17	10	13	15
102	14	13	29	24	10	11	12	13,13	9	11	15
123	14	13	29	24	10	11	13	14,15	10	11	14
122	14	13	29	24	11	11	14	14,16	10	12	14
19	14	13	30	23	10	11	12	13,17	9	11	15
73	14	13	30	23	11	11	12	13,18	10	11	14
12	14	13	31	24	10	11	14	14,17	10	11	14
50	14	14	29	22	10	14	11	13,19	10	12	15
11	14	14	29	23	11	10	14	12,20	11	11	16
142	14	14	30	24	10	11	14	14,16	10	13	14
76	14	15	32	22	11	11	12	14,19	9	11	14
92	15	11	27	22	10	14	12	7,16	10	13	16
129	15	12	27	24	10	11	12	13,17	9	12	15
15	15	12	28	22	10	14	11	14,17	10	14	15
117	15	12	28	23	10	11	13	13,17	9	11	14

TABLE 2—continued.

Sample ID	Y-STR haplotype										
	DYS19	DYS389I	DYS389II	DYS390	DYS391	DYS392	DYS393	DYS385	DYS438	DYS439	DYS437
115	15	12	28	24	10	11	12	12,17	9	11	15
63	15	12	28	24	10	11	12	13,16	9	12	15
10	15	12	28	24	10	11	12	13,18	9	13	15
30	15	12	28	24	10	14	14	13,16	11	11	14
61	15	12	28	22	10	14	11	13,17	10	12	15
25	15	12	28	24	11	11	13	13,17	9	11	15
81	15	13	29	21	11	11	14	13,18	10	12	15
140	15	13	29	22	10	11	11	15,19	9	12	14
5	15	13	29	22	10	11	12	16,16	8	11	14
99	15	13	29	22	10	11	12	14,18	9	11	14
36	15	13	29	22	10	11	12	16,17	9	11	14
62	15	13	29	22	10	11	12	16,17	9	11	14
88	15	13	29	22	10	11	12	15,17	9	11	14
103	15	13	29	22	10	11	13	15,17	9	11	14
100	15	13	29	22	10	11	13	14,15	10	12	15
6	15	13	29	22	10	11	14	13,21	10	10	14
27	15	13	29	23	10	11	12	16,17	9	11	14
45	15	13	29	23	10	11	15	11,19	10	11	15
70	15	13	29	24	10	11	12	14,18	9	11	15
139	15	13	29	24	10	11	13	13,16	9	12	16
13	15	13	29	25	11	11	13	10,14	12	10	14
147	15	13	29	25	11	11	13	11,14	11	10	14
135	15	13	29	25	11	11	13	13,16	9	12	14
87	15	13	29	25	11	13	14	15,19	10	12	14
18	15	13	29	25	11	13	14	14,20	10	13	14
91	15	13	30	21	9	11	14	17,20	10	11	15
46	15	13	30	21	10	11	11	16,16	8	11	14
126	15	13	30	21	11	11	13	12,17	10	13	15
132	15	13	30	21	11	12	12	15,17	11	12	16
116	15	13	30	24	10	10	15	12,20	11	10	16
14	15	13	30	24	11	11	13	11,14	11	10	14
69	15	13	30	25	10	11	13	11,14	11	10	14
127	15	13	30	25	10	11	13	11,14	11	11	14
106	15	13	30	25	11	11	13	11,14	11	10	14
83	15	13	30	25	11	11	15	11,14	11	10	14
53	15	13	30	26	11	11	13	11,15	11	11	14
57	15	13	30	26	11	11	13	11,15	11	11	14
146	15	13	31	23	10	10	14	13,18	11	10	14
95	15	13	31	24	10	14	14	13,16	11	11	14
98	15	13	31	24	11	11	13	11,14	12	10	14
24	15	13	31	25	10	11	13	11,14	11	10	14
112	15	13	31	25	10	11	13	11,14	11	10	14
60	15	13	31	25	10	11	13	11,15	11	10	14
20	15	13	32	22	10	11	12	15,17	9	12	14
72	15	13	32	25	10	11	14	11,14	11	10	14
34	15	14	29	23	10	10	14	19,19	11	11	15
105	15	14	30	22	10	9	12	14,16	9	11	14
148	15	14	30	22	10	11	12	14,19	9	11	14
28	15	14	30	22	10	11	12	15,17	9	11	14
71	15	14	30	22	10	11	12	15,18	9	11	14
16	15	14	30	22	10	11	12	16,17	9	11	14
85	15	14	30	22	10	11	12	16,17	10	12	15
43	15	14	30	22	10	12	12	14,15	10	10	14
90	15	14	30	23	10	10	13	13,20	11	10	16
137	15	14	30	23	10	10	13	14,17	9	11	15
128	15	14	31	23	10	13	13	12,13	11	13	15
39	15	14	31	24	10	11	14	11,14	11	10	14
9	15	14	31	24	11	11	13	10,14	11	11	14
77	15	14	31	25	11	11	13	11,14	11	10	14
56	15	14	31	25	10	11	13	14,14	11	10	14
37	15	14	31	25	10	11	14	11,14	11	10	14
29	15	14	31	25	10	11	13	11,14	11	11	14
124	15	14	31	25	10	11	14	11,14	11	12	14
141	15	14	32	23	10	10	14	12,18	11	13	15
3	15	14	32	23	10	11	13	14,19	9	12	15
96	15	14	32	24	10	11	13	11,14	11	11	14
17	15	14	33	25	10	11	13	11,14	11	10	14
8	15	15	31	22	10	11	12	15,17	9	11	14
67	16	12	28	24	10	11	12	8,18	9	11	15
42	16	12	29	23	10	11	14	14,16	10	11	16
104	16	13	28	23	10	11	14	13,13	11	11	16

TABLE 2—continued.

Sample ID	Y-STR haplotype										
	DYS19	DYS389I	DYS389II	DYS390	DYS391	DYS392	DYS393	DYS385	DYS438	DYS439	DYS437
107	16	13	29	25	11	11	13	11,14	11	10	14
21	16	13	29	25	11	11	13	11,14	11	11	14
113	16	13	30	25	11	11	13	11,13	11	10	14
1	16	13	30	25	11	11	13	11,14	11	10	14
7	16	13	30	25	11	11	13	11,15	11	10	14
80	16	13	31	24	11	11	14	11,14	11	10	14
47	16	13	31	25	10	11	13	11,15	11	10	14
55	16	13	31	25	11	11	13	11,14	11	10	14
31	16	13	31	26	11	11	13	11,13	11	10	14
26	16	13	32	25	11	11	13	11,13	11	10	14
108	16	14	30	26	10	11	13	12,14	11	10	14
35	16	14	31	25	11	11	13	11,15	11	10	14
68	16	14	31	21	12	11	13	13,18	10	10	15
130	16	14	32	25	10	11	13	11,14	11	10	14
109	17	13	29	21	10	11	12	13,14,15	10	11	14
93	17	13	30	25	11	11	13	11,14	11	10	14
33	17	13	30	25	11	11	13	11,14	11	11	14
75	17	13	31	24	11	11	13	11,14	11	10	14