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Announcement of Population Data

Population data for 11 Y-chromosome STRs in northeast China Han

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Abstract

Allele and haplotype frequencies for the 12 Y-specific short tandem repeats (STR) loci DYS19, DYS385a/b, DYS389I/II, DYS390, DYS391, DYS392, DYS393, DYS437, DYS438, DYS439 (PowerPlex® Y System STR Amplification Kit, Promega) were determined in a population sample of 187 unrelated China Han in northeast China.

Keywords: Y-chromosome; Y-STR; PowerPlex® Y System; China Han population

1. Population

A sample of 187 unrelated male China Han from northeast China were collected: 122 from Jilin Province and 65 from Heilongjiang Province. The locations of Jilin and Heilongjiang Provinces were indicated by arrows in the map of China attached.

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2. Extraction

The DNA was extracted from whole blood using John et al.'s method [1].

3. PCR

Template (0.5–1.0 ng) following manufacturer's instructions (PowerPlex® Y System STR Amplification Kit, Promega). All samples were amplified in a thermocycler GeneAmp PCR System 9700 (Applied Biosystems).

4. Typing

ABI Prism® 3100 using manufacturer's recommended protocol (PowerPlex® Y System STR Amplification Kit, Promega). Electrophoresis results were analyzed by GeneScan (version 3.7.1, Applied Biosystems) and Power Typer™ Y Macro (www.Promega.com).

Table 1
Allele frequencies and gene diversities at 12 Y-STR loci in 187 unrelated northeast China Han

Allele	DYS19	DYS3891	DYS389II	DYS390	DYS391	DYS392	DYS393	DYS438	DYS439	DYS437	Genotype	DYS385
7						0.0053					9, 11	0.0053
8					0.0053						9, 12	0.0053
9					0.0107			0.0374			10, 20	0.0053
10					0.7594	0.0053		0.7059	0.0428		11, 11	0.0160
11		0.0107			0.2193	0.1551	0.0267	0.2299	0.3743		11, 12	0.0160
11, 14	0.0053										11, 13	0.0107
12		0.5187			0.0053	0.1444	0.5561	0.0214	0.4332		11, 14	0.0321
13	0.0107	0.3209				0.3369	0.2193	0.0053	0.1390	0.0107	11, 16	0.0214
13, 14										0.0053	11, 17	0.0428
14	0.2567	0.1497				0.2781	0.1604		0.0107	0.5722	11, 18	0.0107
14.3	0.0481										11, 19	0.0160
14, 17	0.0053										11, 21	0.0107
15	0.3636					0.0749	0.0374			0.4011	12, 12	0.0214
16	0.2246									0.0107	12, 13	0.0267
17	0.0856										12, 14	0.0160
18											12, 15	0.0214
19											12, 16	0.0481
20				0.0053							12, 17	0.0481
21				0.0267							12, 18	0.0856
22				0.0588							12, 19	0.0588
22, 25				0.0053							12, 20	0.0267
23				0.3743							12, 21	0.0107
24			0.0053	0.3262							12, 22	0.0160
25			0.0053	0.1818							12, 25	0.0107
26			0.0053	0.0214							13, 13	0.0267
27			0.0909								13, 14	0.0160
28			0.3369								13, 15	0.0214
29			0.3155								13, 16	0.0267
30			0.1444								13, 17	0.0267
31			0.0749								13, 18	0.0481
32			0.0107								13, 19	0.0856
33			0.0053								13, 20	0.0321
34			0.0053								13, 24	0.0053
											14, 16	0.0053
											14, 17	0.0160
											14, 18	0.0535
											14,19	0.0107
											14, 20	0.0053
											14, 22	0.0053
											15, 17	0.0053
											15, 18	0.0107
											15, 21	0.0107
											16, 20	0.0053
D	0.7416	0.6055	0.7520	0.7157	0.3751	0.7586	0.6148	0.4470	0.6510	0.5115		0.9598

n: Number of individuals observed for each haplotype; *D*: STR locus diversity value; haplotype diversity of 12 Y-STR loci = 0.9999.

Table 2
List of haplotypes in 187 unrelated China Han males in northeast China

Haplotye		DYS19	DYS3891	DYS38911	DYS390	DYS391	DYS392	DYS393	DYS438	DYS439	DYS437	DYS385
H1	1	14	13	28	24	8	14	12	11	13	15	13, 20
H2	1	13	13	29	25	9	14	14	12	12	14	15, 21
H3	1	15	14	30	24	9	14	14	12	11	14	15, 21
H4	1	14	11	27	24	10	14	12	11	12	15	14, 19
H5	1	14	12	26	24	10	14	14	11	11	15	13, 19
H6	1	15	12	27	25	10	13	12	10	11	14	14, 18
H7	1	17	12	27	24	10	13	12	10	11	14	14, 17
H8	1	17	12	27	25	10	13	12	10	11	14	14, 18
H9	1	14	12	27	23	10	15	12	11	11	14	13, 19
H10	1	15	12	27	24	10	14	12	11	11	15	13, 19
H11	1	15	12	28	24	10	14	12	9	11	15	12, 19
H12	1	14.3	12	28	24	10	13	13	10	11	14	15, 18
H13	1	15	12	28	23	10	14	13	10	11	14	13, 14
H14	1	17	12	28	23	10	13	12	10	11	14	12, 18
H15	1	17	12	28	25	10	13	12	10	11	14	14, 17
H16	1	17	12	28	26	10	13	12	10	11	14	14, 19
H17	1	15	12	28	23	10	12	12	10	11	15	12, 25
H18	1	17	12	28	24	10	13	12	10	11	15	13, 18
H19	1	17	12	28	24	10	13	12	10	11	15	13, 20
H20	1	14	12	28	23	10	14	12	11	11	14	13, 18
H21	1	14	12	28	23	10	14	13	11	11	14	12, 19
H22	1	14	12	28	23	10	14	13	11	11	14	13, 19
H23	1	14	12	28	24	10	14	12	11	11	15	13, 19
H24	1	14	12	28	24	10	14	12	11	11	15	13, 20
H25	1	14	12	28	24	10	14	12	11	11	15	14, 17
H26	1	14	12	28	25	10	14	12	11	11	15	13, 20
H27	1	17	12	29	25	10	13	12	10	11	14	12, 19
H28	1	17	12	29	25	10	13	12	10	11	14	14, 18
H29	1	14.3	12	29	24	10	12	12	10	11	15	12, 16
H30	1	15	12	29	23	10	12	13	10	11	15	11, 16
H31	1	15	12	29	23	10	12	12	10	11	15	12, 16
H32	1	15	12	29	24	10	12	12	10	11	15	12, 12
H33	1	14	12	29	25	10	14	12	11	11	16	13, 14
H34	1	14.3	12	30	23	10	14	14	10	11	14	13, 14
H35	1	15	12	30	23	10	14	13	10	11	14	13, 13
H36	1	15	12	30	24	10	12	12	10	11	15	12, 20
H37	1	16	12	24	24	10	13	12	10	12	15	12, 17
H38	1	15	12	25	23	10	12	13	10	12	15	12, 15
H39	1	15	12	27	25	10	13	12	10	12	14	12, 20
H40	1	16	12	27	25	10	13	12	10	12	14	13, 19
H41	1	16	12	27	25	10	13	12	10	12	14	12, 20
H42	1	16	12	27	25	10	13	12	10	12	14	12, 25
H43	1	14.3	12	27	23	10	14	12	11	12	14	12, 22
H44	1	15	12	28	23	10	12	12	10	12	14	12, 16
H45	1	17	12	27	23	10	11	14	10	12	14	11, 17
H46	1	15	12	28	23	10	14	13	10	12	14	12, 13
H47	1	16	12	28	24	10	12	12	10	12	14	12, 12
H48	1	16	12	28	25	10	13	12	10	12	14	12, 18
H49	1	16	12	28	24	10	14	12	10	12	14	11, 14
H50	1	14	12	28	25	10	14	12	10	12	15	12, 16
H51	1	14.3	12	28	23	10	14	12	10	12	15	12, 17
H52	1	15	12	28	24	10	12	12	10	12	15	11, 12
H53	1	15	12	28	23	10	12	14	10	12	15	12, 18
H54	1	15	12	28	23	10	13	13	10	12	15	13, 18
H55	1	16	12	28	24	10	13	12	10	12	15	13, 19
H56	1	16	12	28	26	10	13	12	10	12	15	13, 18
H57	1	14	12	28	23	10	14	12	11	12	14	13, 19

Table 2 (*Continued*)

Haplotye		DYS19	DYS3891	DYS38911	DYS390	DYS391	DYS392	DYS393	DYS438	DYS439	DYS437	DYS385
H58	1	15	12	28	25	10	13	12	11	12	14	13, 19
H59	1	14	12	28	24	10	13	12	11	12	15	15, 17
H60	1	14.3	12	28	22	10	12	12	11	12	15	12, 18
H61	1	15	12	28	22	10	12	12	11	12	15	12, 18
H62	1	15	12	28	24	10	13	12	11	12	15	13, 13
H63	1	16	12	28	24	10	14	12	11	12	15	13, 19
H64	1	14	12	28	24	10	14	12	12	12	15	14, 18
H65	1	14	12	29	24	10	14	13	9	12	15	11, 16
H66	1	16	12	29	25	10	13	12	10	12	14	12, 19
H67	1	14	12	29	24	10	15	12	10	12	15	12, 19
H68	1	15	12	29	23	10	12	12	10	12	15	11, 16
H69	1	15	12	30	25	10	13	12	10	12	15	13, 20
H70	1	15	12	27	24	10	14	13	10	13	14	13, 15
H71	1	16	12	28	26	10	13	12	10	13	14	12, 18
H72	1	16	12	28	22	10	14	13	10	13	14	9, 12
H73	1	15	12	28	23	10	12	12	10	13	15	12, 22
H74	1	15	12	28	26	10	13	13	10	13	15	12, 16
H75	1	14	12	29	25	10	15	12	10	13	15	13, 19
H76	1	15	12	29	23	10	12	12	10	13	15	13, 17
H77	1	16	12	30	25	10	13	12	10	13	14	12, 18
H78	1	14	12	28	23	10	12	13	10	14	15	12, 16
H79	1	16	12	30	25	10	11	13	11	10	14	11, 14
H80	1	14	13	29	25	10	11	12	10	10	14	14, 20
H81	1	15	13	29	24	10	11	14	10	10	14	11, 19
H82	1	14	13	30	22	10	14	13	11	10	14	11, 12
H83	1	15	13	28	21	10	14	12	9	11	15	11, 11
H84	1	17	13	28	24	10	12	15	10	11	14	13, 17
H85	1	16	13	28	22	10	14	12	10	11	15	9, 11
H86	1	14	13	29	23	10	11	12	9	11	14	13, 17
H87	1	14	13	29	24	10	11	12	10	11	14	14, 18
H88	1	14	13	29	21	10	15	13	10	11	14	11, 14
H89	1	14	13	29	23	10	15	13	10	11	14	12, 13
H90	1	15	13	29	23	10	11	15	10	11	14	11, 11
H91	1	15	13	29	23	10	11	14	10	11	14	12, 19
H92	1	16	13	29	20	10	11	15	10	11	14	12, 17
H93	1	16	13	29	23	10	11	15	10	11	14	11, 17
H94	1	15	13	30	23	10	13	11	10	11	14	12, 19
H95	1	15	13	30	23	10	14	13	10	11	14	12, 13
H96	1	16	13	30	25	10	13	12	10	11	15	12, 19
H97	1	14	13	31	22	10	11	12	9	11	14	13, 15
H98	1	15	13	31	23	10	13	12	10	11	14	12, 20
H99	1	15	13	28	23	10	11	14	10	12	14	11, 17
H100	1	16	13	28	22	10	14	12	10	12	14	11, 11
H101	1	16	13	28	24	10	14	12	10	12	15	13, 19
H102	1	16	13	29	23	10	11	13	9	12	15	13, 16
H103	1	14	13	29	23	10	15	13	10	12	14	12, 13
H104	1	14.3	13	29	23	10	12	12	10	12	14	13, 16
H105	1	15	13	29	21	10	15	13	10	12	14	11, 14
H107	1	15	13	29	21	10	15	13	10	12	14	11, 14
H106	1	16	13	29	23	10	11	15	10	12	14	11, 16
H108	1	14	13	29	24	10	14	11	11	12	14	14, 18
H109	1	15	13	29	24	10	11	13	11	12	14	12, 14
H110	1	13	13	29	24	10	15	12	11	12	15	12, 18
H111	1	15	13	29	24	10	14	12	11	12	15	13, 18
H112	1	15	13	29	24	10	14	12	11	12	15	14, 16
H113	1	15	13	30	23	10	15	14	10	12	14	12, 19
H114	1	16	13	30	22	10	11	14	10	12	14	12, 18
H115	1	14	13	30	24	10	15	12	11	12	15	13, 17
H116	1	15	13	31	24	10	14	13	10	12	14	12, 18

Table 2 (*Continued*)

Haplotye		DYS19	DYS3891	DYS38911	DYS390	DYS391	DYS392	DYS393	DYS438	DYS439	DYS437	DYS385
H117	1	16	13	31	24	10	11	14	10	12	14	11, 17
H118	1	15	13	31	24	10	13	12	10	12	15	14, 22
H119	2	16	13	32	24	10	11	14	10	12	14	11, 17
H120	1	17	13	28	25	10	13	12	10	13	14	13, 19
H121	1	16	13	29	23	10	11	14	10	13	14	12, 15
H122	1	16	13	29	23	10	7	12	11	13	14	12, 14
H123	1	11,14	13	29	24	10	13	12	11	13	15	12, 18
H124	1	14	13	29	24	10	13	11	11	13	15	13, 15
H125	1	15	13	29	24	10	13	12	11	13	15	12, 18
H126	1	14	14	29	23	10	15	13	11	10	14	12, 13
H127	1	14	14	30	23	10	14	13	10	10	14	13, 24
H128	1	16	14	29	24	10	14	14	10	11	14	12, 17
H129	1	15	14	30	23	10	11	15	10	11	13,14	11, 19
H130	1	15	14	30	23	10	11	13	10	11	14	12, 18
H131	1	15	14	30	24	10	13	14	10	11	14	12, 18
H132	1	16	14	30	24	10	12	14	10	11	14	11, 17
H133	1	14	14	31	24	10	13	14	10	11	14	12, 17
H134	1	15	14	31	22	10	14	12	10	11	14	11, 13
H135	1	15	14	34	24	10	13	14	10	11	14	12, 17
H136	1	15	14	29	23	10	11	14	10	12	14	11, 21
H137	1	16	14	30	25	10	13	12	10	12	15	13, 20
H138	1	14	14	30	25	10	13	12	11	12	15	14, 18
H139	1	14	14	31	23	10	14	13	10	12	14	11, 13
H140	1	15	14	31	23	10	10	14	11	12	14	13, 17
H141	1	14,17	14	33	23	10	13	12	10	12	15	11, 21
H142	1	16	14	29	24	10	13	14	10	13	14	16, 20
H143	1	14.3	14	30	23	10	11	13	11	13	14	12, 14
H144	1	15	14	31	24	10	13	14	10	13	14	12, 22
H145	1	14.3	11	29	24	11	13	13	10	11	15	12, 17
H146	1	15	12	28	24	11	13	12	9	10	15	12, 17
H147	1	15	12	27	23	11	14	13	10	11	14	13, 13
H148	1	16	12	27	25	11	13	12	10	11	14	13, 15
H149	1	16	12	28	24	11	13	12	10	13	13	14, 18
H150	1	15	12	28	23	11	14	13	10	11	14	13, 13
H151	1	15	12	29	23	11	14	13	10	11	14	12, 12
H152	1	16	12	29	25	11	13	12	10	11	14	12, 20
H153	1	15	12	30	23	11	14	14	10	11	14	13, 13
H154	1	16	12	28	24	11	13	12	10	12	13	14, 18
H155	1	17	12	28	23	11	13	12	10	12	14	12, 21
H156	1	14	12	28	21	11	13	13	10	12	15	13, 16
H157	1	15	12	28	22	11	12	13	10	12	15	12, 15
H158	1	16	12	28	22,25	11	12	12	10	12	15	12, 16
H159	1	15	12	29	23	11	12	12	10	12	15	12, 16
H160	1	15	12	29	23	11	12	13	10	12	15	13, 19
H161	1	14	12	29	24	11	14	12	11	12	15	13, 18
H162	1	15	12	30	23	11	12	12	10	12	15	13, 16
H163	1	15	12	27	24	11	13	12	10	13	14	12, 21
H164	1	14	12	27	23	11	15	12	11	13	15	12, 18
H165	1	15	12	28	25	11	13	12	10	13	14	12, 19
H166	1	17	12	28	25	11	13	12	10	13	14	15, 18
H167	1	15	12	29	23	11	12	12	10	13	15	12, 16
H168	1	14	13	28	23	11	15	13	10	10	14	11, 12
H169	1	15	13	28	23	11	12	12	10	11	14	14, 18
H170	1	16	13	28	25	11	13	12	10	11	16	12, 18
H171	1	14	13	29	23	11	11	13	10	11	14	12, 19
H172	1	17	13	29	23	11	11	14	10	11	14	11, 18
H173	1	14	13	29	25	11	13	12	11	12	15	13, 16
H174	1	15	13	31	25	11	13	12	10	11	15	12, 17
H175	1	14	13	28	23	11	14	11	12	12	15	11, 14

Table 2 (*Continued*)

Haplotye		DYS19	DYS3891	DYS38911	DYS390	DYS391	DYS392	DYS393	DYS438	DYS439	DYS437	DYS385
H176	1	15	13	29	23	11	11	15	10	12	14	11, 18
H177	1	14	13	30	25	11	13	12	11	12	15	13, 18
H178	1	14	13	31	24	11	14	11	11	12	15	13, 18
H179	1	15	14	31	23	11	14	13	11	11	14	12, 12
H180	1	14	14	29	25	11	14	12	10	12	14	13, 18
H181	1	16	14	29	23	11	13	14	13	12	14	10, 20
H182	1	17	14	30	23	11	11	14	10	12	14	11, 17
H183	1	14	14	30	22	11	13	13	10	12	15	12, 15
H184	1	16	14	31	23	11	13	14	10	13	14	13, 19
H185	1	14	14	29	24	11	13	12	10	13	15	13, 19
H186	1	16	14	29	23	12	11	14	10	14	14	11, 19

5. Quality control

Laboratory internal control standards and kit controls. Twenty-one random samples (>10% of all 187 samples) were genotyped twice to further ensure result reproducibility and accuracy.

6. Analysis of data

Gene and haplotype diversities were calculated according to Nei [2], by the software population genetic analysis (POPGENE, version 1.31). A comparison with some published China Han populations was computed by means of molecular variance (AMOVA) test [3] implemented in the Arlequin software, version 2.000 [4]. In population comparison, DYS385 was not considered and the number of repeats in DYS389I was subtracted from DYS389II.

7. Results

Results are shown in Tables 1 and 2.

8. Access of data

Available upon request: wsyang@mail.jlu.edu.cn.

9. Other remarks

A total of 186 haplotypes of 12 loci (DYS391, DYS389I/II, DYS439, DYS438, DYS437, DYS19, DYS392, DYS393, DYS390, DYS385a/b) were observed in 187 unrelated individuals. 185 of them were unique and one was found in two individuals (#119). The haplotype diversity was calculated to be 0.9999. These data generated show that the 12 loci haplotypes obtained by using PowerPlex® Y System STR Amplification Kit are highly polymorphic and discriminative in China Han in Jilin and Helongjiang Provinces and useful for forensic testing. However, the Y-chromosomal STR should only be used as a tool complementary to the autosomal STR in paternity testing and forensic casework.

Jilin Province is one origin of Manchu population. Many people of China Han in Jilin and Heilongjiang Provinces are crossbreed descendants of Han and Manchu populations. When combined some published data on Chinese population with our data into a global analysis [5–11], 98.45% of the variance was attributed to large differences within populations ($F_{st} = 0.0155$, $p < 10^{-5}$). Comparisons of pairs of population samples by computing conventional F-statistics and Reynolds distances from haplotype frequencies show significant difference ($p < 10^{-4}$) from the Chinese population data reported by Li et al. ($F_{st} = 0.0033$) [5], Zhang et al. ($F_{st} = 0.0217$) [6], Zhu et al. ($F_{st} = 0.0144$) [7], Hu ($F_{st} = 0.0067$) [8], Wu and Pu ($F_{st} = 0.0183$) [9], respectively. However, no significant difference between our data and the data reported by Hidding and Schmitt [10] and Hu [11] was found.

Our haplotype data were also compared against the data available in YHRD, which currently includes 32,196 haplotypes in 271 populations worldwide for the minimal haplotype (minHt) data set and 7897 haplotypes in a set of 53 populations worldwide for extended haplotype (extHt) data set (http://www.yhrd.org, last update 30/06/2005). One hundred and seventy-two (93.0%) haplotypes detected in the northeast population are in zero matches in YHRD with the extHt database. The haplotype #150 is found to match most frequently in YHRD (five hits in the extHt database).

A total of four insertion mutations, not reported previously in China Han population, were found at DYS19 (two duplication), DYS437 (duplication), DYS390 (duplication). Nine intermediate alleles 14.3 were observed at DYS19.

The nomenclature of haplotype follows the guideline of YHRD (http://www.yhrd.org). This paper follows the guidelines for publication of population data requested by the journal [12].

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