

Notice of Amendment of the FBI's STR Population Data Published in 1999 and 2001

Recently, new amplification kits that expand the number of loci in a multiplex reaction have become commercially available. To establish allele distributions for the additional loci, the FBI Laboratory retyped population samples that were originally genotyped using AmpFISTR Profiler Plus, COfiler, Identifiler (Thermo Fisher Scientific, South San Francisco, CA) and/or GenePrint PowerPlex (Promega Corp., Madison, WI) (1,2) using GlobalFiler (Thermo Fisher Scientific) and PowerPlex Fusion (Promega Corp.) (3). During a comparison of over 1100 DNA profiles from African Americans, Caucasians, Southwest Hispanics, Bahamians, Jamaicans, Trinidadians, Filipinos and Chamorros in the original (4,5) and new studies (3), genotyping discrepancies were discovered. Electronic genotype data corresponding to the published allele frequencies are not available for the Southeast Hispanic, Apache, Navaho and Minnesota Native American populations (6), as well as Filipino and Chamorro populations (except for D2S1338 and D19S433) (7). Genotypes from these populations thus could not be assessed for concordance.

The discrepancies discovered were attributable to (a) human error, typically due to manual data editing and recording, and (b) technological limitations (e.g., insufficient resolution for distinguishing microvariants using polyacrylamide gel electrophoresis). The published genotype data (3,4) from which allele frequencies were calculated also include sample or data processing errors (e.g., genotype duplications).

Allele frequencies cited across these publications (1,2) have been used by the FBI and many forensic laboratories for calculating match statistics in criminal investigations and other types of human identification applications since 1999. Given that statistical estimates based on these data have been included in thousands of laboratory reports and testimonies, the FBI Laboratory believes the discrepancies require acknowledgement. The FBI Laboratory has submitted an erratum notice, which is scheduled to appear in the July issue of the Journal of Forensic Science (please see <http://onlinelibrary.wiley.com/doi/10.1111/1556-4029.12806/abstract> for an online version). This article describes these errors and their effect on profile probability calculations. Empirical testing described in this publication supports that any discrepancy between profile probabilities calculated using the original and corrected data is expected to be less than a factor of two in a full profile. The FBI Laboratory is additionally providing herein the amended allele frequency tables for use by anyone interested in performing comparisons between the multi-locus profile probabilities calculated using the previously published data and the amended allele frequencies.

If you have any questions, please contact the FBI's DNA Support Unit at 703-632-7572.

African American Amended Allele Frequency Table

Caucasian Amended Allele Frequency Table

Southwestern Hispanic Amended Allele Frequency Table

Bahamian Amended Allele Frequency Table

Jamaican Amended Allele Frequency Table

Trinidadian Amended Allele Frequency Table

Chamorro Amended Allele Frequency Table

Filipino Amended Allele Frequency Table

References

1. Budowle B, Moretti TR, Baumstark AL, Defenbaugh DA and Keys KM. Population data on the thirteen CODIS core short tandem repeat loci in African Americans, US Caucasians, Hispanics, Bahamians, Jamaicans and Trinidadians. *J Forensic Sci* 1999;44:1277-1286.
2. Budowle B, Collins P, Dimsoski P, Ganong C, Hennessy L, Leibel C, Rao-Coticone S, Shadravan F & Reeder D. Population data on the STR loci D2S1338 and D19S433. *Forensic Sci Communications* 2001;3(3).
3. Moretti TR, Moreno LI, Smerick JB, Pignone ML, Hizon RC , Onorato AJ, Bright J-A and Buckleton JS. Population data on the expanded CODIS core STR loci for eleven populations of significance for forensic DNA analyses in the United States. *Forensic Sci International: Genetics* 2015;(in preparation).
4. Budowle B and Moretti TR. Genotype Profiles for six population groups at the 13 CODIS short tandem repeat core loci and other PCR based loci. *Forensic Sci Communications* 1999;1(2).
5. Budowle B. Genotype profiles for five population groups at the short tandem repeat loci D2S1338 and D19S433. *Forensic Sci Communications* 2001;3(3).
6. Budowle B, Shea B, Niezgoda S and Chakraborty R. CODIS STR loci data from 41 sample populations. *J Forensic Sci* 2001;46:453-489.
7. Budowle B, Defenbaugh DA and Keys KM. Genetic variation at nine short tandem repeat loci in Chamorros and Filipinos from Guam. *Legal Medicine* 2000;2:26-30.

African American Amended Allele Frequencies

Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	D2S1338	D19S433	Allele
6											0.0861	0.1095				6
7							0.0028		0.0071	0.0429	0.0215	0.4405				7
8				0.0028			0.0500	0.0335	0.1738	0.0857	0.3684	0.1857	0.0359			8
9				0.0056			0.0139	0.0279	0.1571	0.0333	0.1818	0.1452	0.1986			9
9.3												0.1048				9.3
10				0.0250			0.0639	0.0503	0.3238	0.2714	0.0933	0.0143	0.1100		0.0150	10
<11						0.0056										<11
11		0.0028		0.0361		0.0056	0.2611	0.2374	0.2238	0.2048	0.2249		0.2943		0.0689	11
<12	0.0048															<12
12	0.0024			0.1083		0.0587	0.3556	0.4832	0.0905	0.3000	0.0239		0.1866		0.1138	12
12.2															0.0808	12.2
13	0.0119	0.0056		0.2222		0.0559	0.2444	0.1257	0.0190	0.0548			0.1651		0.2964	13
13.2						0.0056									0.0509	13.2
14	0.1214	0.0667		0.3333		0.0642	0.0056	0.0391	0.0048	0.0071			0.0096		0.1946	14
14.2															0.0539	14.2
15	0.2905	0.2361		0.2139		0.1676		0.0028							0.0419	15
15.2															0.0389	15.2
16	0.3071	0.2694		0.0444		0.1872								0.0449	0.0210	16
>16							0.0028									>16
16.2															0.0180	16.2
17	0.2000	0.1833		0.0083		0.1620								0.1018		17
17.2			0.0028												0.0030	17.2
18	0.0548	0.1361	0.0083			0.1313								0.0659		18
18.2			0.0083												0.0030	18.2
19	0.0048	0.0722	0.0528			0.0782								0.1377		19
>19	0.0024															>19
19.2			0.0028													19.2
20		0.0278	0.0722			0.0559								0.0629		20
21			0.1250			0.0112								0.1527		21
22			0.2250			0.0056								0.1377		22
22.2			0.0056													22.2
23			0.1250			0.0056								0.0988		23
24			0.1861											0.0928		24
24.2				0.0028												24.2
25			0.1000											0.0838		25
26			0.0361	0.0028										0.0210		26
27			0.0222	0.0615												27
28			0.0167	0.2151												28
29			0.0056	0.1899												29
29.3				0.0028												29.3
30			0.0028	0.1788												30
30.2			0.0028	0.0084												30.2
31				0.0922												31
31.2				0.0754												31.2
32				0.0084												32
32.2				0.0698												32.2
33				0.0084												33
33.2				0.0335												33.2
34				0.0084												34
34.2				0.0028												34.2
35				0.0279												35
36				0.0056												36
37				0.0056												37
Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	D2S1338	D19S433	Allele
N	210	180	180	180	179	179	180	179	210	210	209	210	209	167	167	

Caucasian Amended Allele Frequencies

Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	D2S1338	D19S433	Allele
6									0.0025			0.2252				6
7									0.0173	0.0025		0.1733				7
8				0.0179				0.0995	0.1634	0.0050	0.5470	0.1262	0.0199			8
8.3												0.0025				8.3
9				0.0102			0.0308	0.0765	0.1460	0.0198	0.1238	0.1658	0.1045			9
9.3												0.3045				9.3
10				0.1020			0.0487	0.0510	0.2896	0.2525	0.0371	0.0025	0.0647			10
10.3										0.0025						10.3
<11						0.0128										<11
11				0.0587		0.0128	0.4103	0.3214	0.2030	0.2995	0.2550		0.2736			11
12				0.1454		0.1276	0.3538	0.3061	0.1411	0.3267	0.0371		0.3383		0.1086	12
12.2															0.0066	12.2
13	0.0025	0.0051		0.3393		0.1224	0.1462	0.1097	0.0297	0.0718			0.1642		0.2829	13
13.2															0.0263	13.2
14	0.1386	0.1020		0.2015		0.1735	0.0077	0.0357	0.0074	0.0149			0.0323		0.3355	14
14.2															0.0033	14.2
15	0.2475	0.1122		0.1097		0.1276	0.0026			0.0050			0.0025		0.1349	15
15.2															0.0263	15.2
16	0.2327	0.2015		0.0128		0.1071								0.0296	0.0428	16
16.2															0.0263	16.2
17	0.2104	0.2628		0.0026		0.1556								0.1941		17
17.2															0.0033	17.2
18	0.1634	0.2219	0.0306			0.0918								0.0526		18
18.2															0.0033	18.2
19	0.0050	0.0842	0.0561			0.0357								0.1447		19
20		0.0102	0.1454			0.0255								0.1546		20
20.2			0.0026													20.2
21			0.1735			0.0051								0.0197		21
22			0.1888			0.0026								0.0296		22
22.2			0.0102													22.2
23			0.1582											0.1349		23
24			0.1378											0.1217		24
24.2					0.0051											24.2
25			0.0689											0.0954		25
26			0.0179											0.0230		26
27			0.0102		0.0459											27
28					0.1658											28
29					0.1811											29
30					0.2321											30
30.2					0.0383											30.2
31					0.0714											31
31.2					0.1020											31.2
32					0.0153											32
32.2					0.1097											32.2
33.2					0.0306											33.2
35.2					0.0026											35.2
Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	D2S1338	D19S433	Allele
N	202	196	196	196	196	196	195	196	202	202	202	202	201	152	152	

Southwest Hispanic Amended Allele Frequencies

Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	D2S1338	D19S433	Allele
5												0.0024				5
6									0.0024		0.0048	0.2321				6
7							0.0616		0.0215	0.0024	0.0048	0.3373				7
8				0.0025			0.0025	0.0665	0.0981		0.5550	0.0813	0.0168			8
9				0.0025			0.0542	0.2192	0.0478	0.0072	0.0335	0.1029	0.0793		0.0035	9
9.3												0.2416				9.3
10				0.0936			0.0640	0.1010	0.3062	0.2536	0.0335	0.0024	0.1755			10
<11						0.0049										<11
11		0.0025		0.0616		0.0123	0.4261	0.2020	0.2895	0.2656	0.2727		0.3149		0.0035	11
12				0.1207		0.1059	0.2882	0.2167	0.1914	0.3923	0.0933		0.2885		0.0563	12
12.2															0.0211	12.2
13	0.0024			0.3251		0.1700	0.0961	0.1379	0.0383	0.0646	0.0024		0.1010		0.1620	13
13.2															0.1092	13.2
14	0.0789	0.0616		0.2463		0.1700	0.0049	0.0567	0.0048	0.0096			0.0240		0.3204	14
14.2															0.0458	14.2
15	0.4258	0.0714		0.1158		0.1379	0.0025			0.0048					0.1197	15
15.2															0.0810	15.2
16	0.2656	0.3645		0.0246		0.1158								0.0176	0.0423	16
16.2															0.0352	16.2
17	0.1268	0.2217		0.0074		0.1379								0.2218		17
18	0.0837	0.1946	0.0025			0.0517								0.0423		18
19	0.0144	0.0714	0.0813			0.0369								0.2606		19
>19	0.0024															>19
20		0.0123	0.0690			0.0172								0.1408		20
20.2			0.0025													20.2
21			0.1305			0.0197									0.0106	21
21.2			0.0025													21.2
22			0.1773			0.0074								0.0704		22
>22						0.0123										>22
22.2			0.0049													22.2
23			0.1404											0.1232		23
23.2			0.0074													23.2
24			0.1256											0.0669		24
24.2					0.0025											24.2
25			0.1379											0.0387		25
26			0.0837											0.0070		26
27			0.0320		0.0099											27
28			0.0025		0.0690											28
29					0.2044											29
29.2					0.0025											29.2
30					0.3300											30
30.2					0.0320											30.2
31					0.0690											31
31.2					0.0862											31.2
32					0.0123											32
32.2					0.1355											32.2
33.2					0.0419											33.2
34.2					0.0049											34.2
Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	D2S1338	D19S433	Allele
N	209	203	203	203	203	203	203	203	209	209	209	209	208	142	142	

Bahamian Amended Allele Frequencies

Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	Allele
5												0.0032		5
6										0.0032	0.0673	0.1538		6
7								0.0031	0.0126	0.0641	0.0256	0.3846		7
8							0.0723	0.0220	0.1541	0.0577	0.3237	0.2276	0.0385	8
9				0.0032			0.0094	0.0314	0.1258	0.0481	0.2212	0.1282	0.2147	9
9.3												0.0897		9.3
10				0.0194			0.0597	0.0252	0.3396	0.2340	0.0897	0.0128	0.0994	10
<11						0.0097								<11
11		0.0094		0.0516		0.0097	0.2390	0.3050	0.2201	0.2244	0.2372		0.3013	11
11.3									0.0031					11.3
12				0.1290		0.0484	0.3711	0.3994	0.1195	0.2853	0.0353		0.1731	12
13		0.0283		0.1903		0.0516	0.2264	0.1604	0.0252	0.0705			0.1442	13
13.2						0.0032								13.2
14	0.0742	0.0629		0.3387		0.0452	0.0157	0.0535		0.0096			0.0256	14
15	0.3194	0.1541		0.1839		0.1548	0.0063			0.0032			0.0032	15
15.2	0.0032					0.0032								15.2
16	0.3387	0.2642		0.0613		0.1645								16
17	0.1968	0.2013		0.0226		0.1871								17
<18			0.0129											<18
18	0.0645	0.1824				0.1258								18
18.2			0.0129											18.2
19	0.0032	0.0723	0.0581			0.0968								19
20		0.0252	0.0742			0.0484								20
21			0.1129			0.0226								21
21.2			0.0032			0.0032								21.2
22			0.1452			0.0258								22
22.3			0.0032											22.3
23			0.1774											23
24			0.1968											24
24.3					0.0065									24.3
25			0.0968											25
26			0.0323											26
27			0.0516		0.0710									27
28			0.0097		0.2226									28
29			0.0065		0.1742									29
30					0.1774									30
>30			0.0065											>30
30.2					0.0097									30.2
30.3					0.0032									30.3
31					0.0935									31
31.2					0.0484									31.2
32					0.0194									32
32.2					0.0968									32.2
33					0.0032									33
33.2					0.0387									33.2
34					0.0097									34
34.2					0.0032									34.2
35					0.0226									35
Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	Allele
N	155	159	155	155	155	155	159	159	159	156	156	156	156	

Jamaican Amended Allele Frequencies

Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	Allele
5												0.0024		5
6									0.0041		0.0673	0.1394		6
7								0.0020	0.0061	0.0481	0.0313	0.3558		7
8							0.0533	0.0205	0.1988	0.0625	0.3822	0.2548	0.0340	8
9				0.0077			0.0102	0.0246	0.1393	0.0313	0.2644	0.1587	0.2087	9
9.3												0.0841		9.3
10				0.0129			0.0553	0.0246	0.3443	0.2716	0.0745	0.0048	0.1092	10
10.1									0.0020					10.1
<11						0.0026								<11
11		0.0041		0.0309		0.0052	0.2049	0.2766	0.1844	0.2332	0.1538		0.3131	11
12	0.0052			0.1160		0.0438	0.3996	0.4549	0.1025	0.2933	0.0264		0.1869	12
13	0.0155	0.0082		0.2139		0.0258	0.2561	0.1434	0.0123	0.0529			0.1383	13
13.2						0.0052								13.2
14	0.0670	0.0738		0.3273		0.0412	0.0143	0.0533	0.0061	0.0072			0.0097	14
14.2						0.0026								14.2
15	0.3376	0.2275		0.2165		0.1572	0.0061							15
15.2	0.0026													15.2
16	0.3067	0.2910		0.0670		0.1907								16
17	0.2113	0.1824		0.0052		0.1830								17
<18			0.0077											<18
18	0.0464	0.1311		0.0026		0.1237								18
18.2			0.0206											18.2
19	0.0077	0.0533	0.0670			0.0954								19
19.2			0.0077											19.2
20		0.0225	0.0464			0.0696								20
21		0.0061	0.0747			0.0284								21
21.2						0.0026								21.2
22			0.1881			0.0155								22
23			0.1959			0.0052								23
24			0.1469			0.0026								24
24.3			0.0026		0.0026									24.3
25			0.1160											25
26			0.0412											26
27			0.0515		0.0644									27
28			0.0155		0.2732									28
29			0.0077		0.1830									29
30					0.1649									30
>30			0.0103											>30
30.2					0.0180									30.2
31					0.0644									31
31.2					0.0490									31.2
32					0.0155									32
32.1					0.0026									32.1
32.2					0.0619									32.2
33					0.0052									33
33.2					0.0309									33.2
34					0.0077									34
34.2					0.0026									34.2
35					0.0412									35
36					0.0103									36
37					0.0026									37
Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	Allele
N	194	244	194	194	194	194	244	244	244	208	208	208	206	

Trinidadian Amended Allele Frequencies

Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	Allele
5												0.0061		5
6											0.0976	0.1829		6
7							0.0118		0.0060	0.0671	0.0122	0.3110		7
8				0.0063			0.0235	0.0536	0.2083	0.0549	0.3232	0.2073	0.0610	8
9							0.0294	0.0476	0.1131	0.0244	0.1646	0.2073	0.1646	9
9.3												0.0732		9.3
10				0.0500			0.1529	0.0536	0.3333	0.2744	0.0671	0.0122	0.1280	10
<11						0.0064								<11
11		0.0059		0.0750		0.0256	0.2941	0.2798	0.2202	0.2134	0.2866		0.2866	11
12				0.1563		0.0833	0.3235	0.3214	0.1012	0.2744	0.0488		0.1829	12
13		0.0059		0.2250		0.0962	0.1353	0.1607	0.0179	0.0793			0.1402	13
13.2						0.0064								13.2
13.3													0.0061	13.3
14	0.0563	0.0882		0.2500		0.1090	0.0235	0.0833		0.0122			0.0305	14
15	0.3125	0.1412		0.1813		0.1538								15
16	0.3188	0.2941		0.0563		0.2051	0.0059							16
17	0.2000	0.2647				0.0513								17
18	0.1125	0.1353	0.0125			0.0577								18
19		0.0471	0.0563			0.0962								19
20		0.0176	0.0938			0.0705								20
21			0.1000			0.0385								21
22			0.1688											22
23			0.1625											23
24			0.2063											24
25			0.1063											25
26			0.0438											26
27			0.0188		0.0625									27
28			0.0125		0.2250									28
29			0.0063		0.2000									29
29.2					0.0063									29.2
30					0.1750									30
>30			0.0125											>30
30.2					0.0125									30.2
31					0.0500									31
31.2					0.0813									31.2
32					0.0313									32
32.2					0.0688									32.2
33					0.0063									33
33.2					0.0500									33.2
34					0.0188									34
35					0.0125									35
Allele	D3S1358	vWA	FGA	D8S1179	D21S11	D18S51	D5S818	D13S317	D7S820	CSF1PO	TPOX	TH01	D16S539	Allele
N	80	85	80	80	80	78	85	84	84	82	82	82	82	

Chamorro Amended
Allele Frequencies

Allele	D2S1338	D19S433	Allele
12		0.0347	12
12.2		0.0139	12.2
13		0.3542	13
13.2		0.0417	13.2
14		0.2292	14
14.2		0.0972	14.2
15		0.0903	15
15.2		0.0972	15.2
16	0.0278		16
16.2		0.0139	16.2
17	0.1042		17
17.2		0.0278	17.2
18	0.0833		18
19	0.1875		19
20	0.1111		20
21	0.0139		21
22	0.0972		22
23	0.1736		23
24	0.1319		24
25	0.0556		25
26	0.0069		26
27	0.0069		27
Allele	D2S1338	D19S433	Allele
N	72	72	

Filipino Amended Allele Frequencies

Allele	D2S1338	D19S433	Allele
12		0.0286	12
13		0.2857	13
13.2		0.0357	13.2
14		0.1571	14
14.2		0.0500	14.2
15		0.1071	15
15.2		0.2500	15.2
16	0.0286	0.0143	16
16.2		0.0643	16.2
17	0.0786		17
17.2		0.0071	17.2
18	0.0571		18
19	0.2214		19
20	0.0786		20
21	0.0286		21
22	0.0643		22
23	0.1357		23
24	0.2643		24
25	0.0357		25
26	0.0071		26
Allele	D2S1338	D19S433	Allele
N	70	70	