

Announcement of population data

Genetic profile of the Ecuadorian Mestizo population (Ecuador—South America) by using the Power Plex[®] 16 System Kit

Fabricio González-Andrade^{a,*}, Dora Sánchez-Q^a,
Begoña Martínez-Jarreta^b

^a*Servicio de Genética, Cruz Roja Ecuatoriana, Av. Colombia y Elizalde esquina, Quito, Ecuador*

^b*Department of Legal Medicine, University of Zaragoza, Zaragoza, Spain*

Received 3 March 2003; received in revised form 11 April 2003; accepted 14 April 2003

Abstract

Allele frequency data for the 15 STR systems and Amelogenine were determined in a population sample of healthy Mestizo unrelated individuals. All loci met Hardy–Weinberg expectations and the high discrimination power of combined system showed the forensic efficiency of these genetic markers. There is a lack of information on Ecuadorian population from a genetic point of view and therefore no previous publications on the distribution of STRs on Mestizos is available. Mestizos are descendants of Spanish and Amerindian people, however, significant differences were found between the former and the populations from Spanish peninsula, that have been analyzed for these genetic markers.

© 2003 Elsevier Ireland Ltd. All rights reserved.

Keywords: Ecuador; STRs; Forensic genetics; Population data; Mestizo

Population sample: Whole blood was obtained in EDTA vacutainers tubes by venipuncture from healthy unrelated Mestizos born and living in Ecuador. Samples came from the Paternity Test Bank of the Cruz Roja Ecuatoriana, Genetics Laboratory [1].

N: 317 individuals.

DNA extraction: The DNA was extracted using Wizard Genomic DNA Purification Kit System[®] (Promega Corporation, Madison, WI, USA), and the quantity was estimated by UV absorbance (Gene Quant Calculator[®], Pharmacia, Uppsala, Sweden).

PCR: Amplification was performed in a Techne Thermal Cycler, model Genius[®] following the manufacturer's recommendations [2].

Typing: By ABI Prism 310. Fragment size and allele designation of different loci was determined by comparison with allelic ladders distributed into the Power Plex[®] 16 System Kit (Promega) [2]. The recommendations of the DNA

Commission of the International Society of Forensic Haemogenetics for analysis of STRs systems were followed [3,4].

Results: See Tables 1 and 2.

Quality control: Proficiency testing of the GEP-ISFG Working Group (<http://www.gep-isfg.org>).

Analyses of data: Evaluation of Hardy–Weinberg expectations was carried out using the Exact-test and determination of further statistical parameters of forensic interest was carried out by using the computer programme HWE-analysis version 3.3 (Christoph Puers, Institute for Legal Medicine, University of Münster), as previously described [5].

Other remarks: This paper follows the guidelines for publication data requested by the journal [6]. Ecuador is a small South American country with almost 12 million inhabitants comprised of three main ethnic groups: (a) urban populations, usually dihybrid-Mestizos or trihybrid-Mestizos, (b) Amerindian natives, more than 100 multiethnic and pluricultural groups, and (c) African-derived populations in fairly isolated communities and descendants of slaves [7]. Mestizos are the most representative and largest group in our country. They are descendants of Spanish (Caucasian) and

* Corresponding author. Tel.: +593-2-2584724.

E-mail address: fabriciogonzalez@usa.net (F. González-Andrade).

Table 1
Allele distribution of 15 STR loci and Amelogenin in an population sample of Ecuadorian Mestizos ($n = 317$)

Allele	D3S1358	TH01	D21S11	D18S51	Penta E	D5S818	D13S317	D7S820	D16S539	CSF1PO	Penta D	VWA	D8S1179	TPOX	FGA
2.2	-	-	-	-	-	-	-	-	-	-	0.004	-	-	-	-
3.2	-	-	-	-	-	-	-	-	-	-	0.002	-	-	-	-
5	-	-	-	-	0.033	-	-	-	-	-	0.002	-	-	-	-
6	-	0.331	-	-	-	-	-	-	-	-	-	-	-	-	-
7	-	0.292	-	-	0.071	0.125	-	0.002	-	0.004	0.006	-	-	-	-
8	-	0.076	-	-	0.027	0.002	0.080	0.067	0.017	0.002	0.016	-	0.008	0.558	-
9	-	0.092	-	-	0.006	0.086	0.188	0.054	0.177	0.010	0.206	-	0.004	0.041	-
9.3	-	0.196	-	-	-	-	-	-	-	-	-	-	-	-	-
10	-	0.014	-	0.004	0.035	0.028	0.078	0.278	0.207	0.261	0.233	0.002	0.065	0.017	-
11	-	-	-	0.018	0.061	0.433	0.202	0.301	0.230	0.278	0.121	0.004	0.060	0.273	-
12	0.008	-	-	0.073	0.188	0.241	0.237	0.264	0.262	0.357	0.162	0.002	0.212	0.112	-
13	0.004	-	-	0.098	0.069	0.073	0.110	0.023	0.095	0.081	0.174	0.002	0.319	-	-
14	0.057	-	-	0.249	0.049	0.009	0.104	0.001	0.013	0.006	0.067	0.048	0.204	-	-
15	0.457	-	-	0.161	0.122	-	0.002	-	-	-	0.006	0.079	0.101	-	-
16	0.270	-	-	0.110	0.090	-	-	-	-	-	-	0.379	0.026	-	-
17	0.146	-	-	0.139	0.063	-	-	-	-	-	-	0.302	-	-	0.009
18	0.049	-	-	0.071	0.051	-	-	-	-	-	-	0.143	-	-	0.002
19	0.010	-	-	0.027	0.031	-	-	-	-	-	-	0.026	-	-	0.006
19.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002
20	-	-	-	0.020	0.043	-	-	-	-	-	-	0.009	-	-	0.081
20.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002
21	-	-	-	0.020	0.037	-	-	-	-	-	-	0.002	-	-	0.103
22	-	-	-	0.006	0.016	-	-	-	-	-	-	-	-	-	0.105
22.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002
23	-	-	-	0.004	0.006	-	-	-	-	-	-	-	-	-	0.116
23.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.007
24	-	-	-	0.002	-	-	-	-	-	-	-	-	-	-	0.189
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.191
25.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.002
26	-	-	0.002	-	-	-	-	-	-	-	-	-	-	-	0.072
27	-	-	0.014	-	-	-	-	-	-	-	-	-	-	-	0.037
28	-	-	0.069	-	-	-	-	-	-	-	-	-	-	-	0.002
29	-	-	0.196	-	-	-	-	-	-	-	-	-	-	-	0.002
29.2	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-
30	-	-	0.246	-	-	-	-	-	-	-	-	-	-	-	-
30.2	-	-	0.026	-	-	-	-	-	-	-	-	-	-	-	-
31	-	-	0.077	-	-	-	-	-	-	-	-	-	-	-	-
31.2	-	-	0.149	-	-	-	-	-	-	-	-	-	-	-	-
32	-	-	0.006	-	-	-	-	-	-	-	-	-	-	-	-
32.2	-	-	0.149	-	-	-	-	-	-	-	-	-	-	-	-
33.2	-	-	0.052	-	-	-	-	-	-	-	-	-	-	-	-
34.2	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-
35	-	-	0.004	-	-	-	-	-	-	-	-	-	-	-	-
35.2	-	-	0.002	-	-	-	-	-	-	-	-	-	-	-	-
Exact-test	0.0062	0.4696	0.0916	0.0066	0.1148	0.1422	0.4094	0.0868	0.8828	0.0198	0.8664	0.2828	0.0546	0.3110	0.0278
χ^2 -test	0.0374	0.0396	0.1120	0.0312	0.2966	0.2890	0.2698	0.0458	0.9340	0.0026	0.8172	0.3272	0.1606	0.3586	0.0596
G-test	0.0092	0.6456	0.0690	0.0090	0.4610	0.2224	0.4110	0.1338	0.9090	0.0320	0.8040	0.4940	0.1252	0.3386	0.0342

Table 2
Forensic value of the analysed systems expressed as various statistical parameters

STR locus	MEC	PIC	P_m	D
D3S1358	0.4551	0.6458	0.1432	0.8568
HUMTH01	0.5272	0.7125	0.1065	0.8935
D21S11	0.6871	0.8235	0.0469	0.9531
D18S51	0.7211	0.8442	0.0415	0.9585
Penta E	0.8215	0.9054	0.1759	0.9824
D5S818	0.5048	0.6878	0.1103	0.8897
D13S317	0.6652	0.8109	0.0526	0.9473
D7S820	0.5272	0.7129	0.1042	0.8957
D16S539	0.5928	0.7634	0.0761	0.9239
CSF1PO	0.4689	0.6690	0.1262	0.8737
Penta D	0.6523	0.8043	0.0524	0.9476
HUMVWA	0.5118	0.6948	0.1164	0.8836
D8S1179	0.5994	0.7635	0.0726	0.9274
HUMTPOX	0.3481	0.5425	0.2270	0.7729
FGA	0.7509	0.8635	0.0306	0.9694

MEC: mean paternity exclusion chance; PIC: polymorphism information content; P_m : probability of match; D : discrimination power. Cumulative power of discrimination (PD) was 0.9999 and cumulative mean exclusion chance (MEC) was 0.9999.

Amerindian people. Amerindians were easily assimilated in this new class by society. Sometimes, the union between a conqueror and an Amerindian had political or religious reasons: domination of a territory or conversion to Catholicism [8]. Actually, Mestizos mostly live in urban regions.

References

- [1] F. González-Andrade, D. Sánchez-Q, B. Martínez-Jarreta, Evaluation of 1495 cases of disputed paternity in Ecuador (South America) resolved with STR-PCR polymorphisms, in: Proceedings of the International Association of Forensic Sciences, Monduzzi, 2002, pp. 225–230.
- [2] Promega Corporation, Gene Print™ STR Systems for silver stain detection, Technical Manual (TMD. No.004), 1998.
- [3] International Society for Forensic Haemogenetics, Recommendations of the DNA Commission of the International Society for Forensic Haemogenetics relating to the use of PCR-based polymorphisms, 1992; Forensic Sci. Int. 55 (1) (1992) 1–3.
- [4] W. Bär, B. Brinkmann, B. Budowle, A. Carracedo, P. Gill, P. Lincoln, W. Mayr, B. Olaisen, DNA recommendations, further report of the DNA Commission of the ISFH regarding the use of short tandem repeat systems, 1997; Forensic Sci Int. 87 (3) (1997) 181–184.
- [5] B. Martínez-Jarreta, P. Díaz Roche, E. Abecia, Genetic variation at six STR loci (CTT, FFV) in Aragon (north Spain), Forensic Sci. Int. 100 (1–2) (1999) 87–92.
- [6] P. Lincoln, A. Carracedo, Publication of population data of human polymorphisms, Forensic Sci. Int. 110 (2000) 3–5.
- [7] D. Sánchez, Human identification in Ecuador, in: C. Cerón (Ed.), in: Proceedings of the Memories of the 22nd Symposium of Biology in Ecuador, Central University of Ecuador, 1998, pp. 79–80.
- [8] M. SÁns, Admixture studies in Latin America: from the 20th century to the 21st century, Hum. Biol. 72 (1) (2000) 155–177.