

FOR THE RECORD

Joaquín-Jose Gamero,¹ Ph.D.; Jose-Luis Romero,¹ Ph.D.; Juan-Luis González,¹ Ph.D.;
Monica Carvalho,² B.S.; María-Joao Anjos,² B.S.; Francisco Corte Real,² Ph.D.;
and María-Conceição Vide,² B.S.

A Study on Four Short Tandem Repeat Systems: African Immigrant, Portuguese, and Spanish population data

POPULATION: Portuguese, Spaniards from the southwest of Spain, Spaniards of Caucasian origin from North Africa (Ceuta), immigrants from Morocco and immigrants from West Africa.

KEYWORDS: forensic science, DNA typing, PCR, short tandem repeats, population genetics

Specimens were collected from unrelated volunteer blood donors. The DNA was extracted using Chelex 100 protocol (1). Five μL aliquots of the extracts with a DNA content of approximately 5 ng/ μL were used for amplification. The TH01, VWA, F13A1 and FES/FPS locus was amplified as described by Corte Real (2). Electrophoresis was carried out on 4% polyacrylamide denaturing sequencing gels on a 377 automated system (Applied Biosystems). Data were analyzed using the exact test for Hardy-Weinberg equilibrium (3,4), the chance of exclusion (CE) for paternity (5) and the discrimination power (6).

Sample populations of Caucasian Spaniards from North Africa (Ceuta) and of African immigrants from West Africa (Table 2), were observed to be in Hardy-Weinberg equilibrium for almost all the analyzed markers ($p > 0.01$ in the four systems), except for the HUMVWA31A system. Possible reasons include inbreeding, population substructure and selection (7). In the specific case of the population of Spaniards of Caucasian origin from North Africa, the disequilibrium observed for this marker (HUMVWA31A) may be the consequence of the migratory movements that constantly take place in the zone. Likewise, given the influence on the genepool of the structure or composition of the West African black immigrant population in the south and center of Europe, currently made up of individuals from different geographical areas of West Africa, population substructure appears to be the most likely explanation for this deviation for HUMVWA31A loci.

The complete dataset is available to any interested researcher upon request made to Joaquín-Jose Gamero, Ph.D., Dpto. Medicina Legal, Facultad de Medicina, Universidad de Cádiz, Plaza Fragela s/n, 11003, Cádiz, España. Email: joaquin.gamero@uca.es

References

1. Walsh PS, Metzger DA, Higuchi R. CHELEX 100 as a medium for simple extraction of DNA for PCR-based typing from forensic material. *Biotechniques* 1991;10, (4):506-13.
2. Corte-Real F, Souto L, Anjos MJ, Carvalho, M, Vieira DN, Carracedo A, Vide C. Population study of HUMTH01, HUMVWA31/A, HUMF13A1 and HUMFES/FPS systems in Azores. *J Forensic Sci* 1999;44,(6):1261-4.
3. Guo SW, Thompson EA. Performing the exact test of Hardy-Weinberg proportion for multiples alleles. *Biometrics* 1992;48:361-72.
4. Raymond M, Rousset F. GENEPOP (version 3.1b, December, 1997) population genetics software for exact tests and ecumenicism. *J Hered* 1995;86:248-9.
5. Ohno Y, Sebetan IM, Akaishi S. A simple method for calculating the probability of excluding paternity with any number of codominant alleles. *Forensic Sci Int* 1982;19:93-8.
6. Jones DA. Blood samples: probability of discrimination. *J Forensic Sci Soc* 1972;12:355-9.
7. National Research Council. The evaluation of forensic DNA Evidence National Academy Press, Washington, DC, 1996.

Additional information and reprint requests:

Joaquín-José Gamero, Ph.D.
Dpto. Medicina Legal
Facultad de Medicina
Universidad de Cádiz
Plaza Fragela s/n, 11003, Cádiz
España
Email: joaquin.gamero@uca.es

¹ Faculty of Medicine, University of Cádiz, Fragela s/n, Cádiz 11003, Spain.

² Institute of Legal Medicine of Coimbra, 3000 Coimbra, Portugal.

TABLE 1—Allele frequency distribution for four STR loci in five populations investigated.

Locus	Allele	Portugal n = 344	Moroccan Im. n = 108	North African (Spain) n = 110	S.W. Spain n = 201	W. African Black Im. n = 110	
HUMTH01	5					0.0045	
	6	0.2311	0.1157	0.1636	0.2363	0.0995	
	7	0.1265	0.2037	0.1863	0.1617	0.4091	
	8	0.1352	0.1805	0.1363	0.1269	0.2136	
	9	0.1933	0.3240	0.2182	0.2015	0.1955	
	9.3	0.3052	0.1342	0.2763	0.2662	0.0682	
	10	0.0087	0.0370	0.0182	0.0074	0.0136	
	11		0.0046				
	HUMFES	8	0.0189	0.0324	0.0182	0.0050	0.1111
		9		0.0509	0.0318	0.0025	0.1065
		10	0.3110	0.3611	0.3182	0.3184	0.2269
11		0.3881	0.3148	0.3455	0.3682	0.3009	
12		0.2471	0.1759	0.2409	0.2487	0.1667	
13		0.0349	0.0648	0.0454	0.0572	0.0833	
HUMVWA31/A	14					0.0046	
	4					0.0046	
	5					0.0046	
	6					0.0046	
	8					0.0046	
	12					0.0046	
	13	0.0014	0.0046		0.0050	0.0091	
	14	0.1221	0.1343	0.1045	0.0920	0.0773	
	15	0.1148	0.1991	0.1273	0.1070	0.2182	
	16	0.2224	0.2222	0.2364	0.2264	0.2318	
	17	0.2762	0.2037	0.2409	0.3134	0.2227	
	18	0.1817	0.1389	0.2000	0.1368	0.1227	
	19	0.0669	0.0741	0.0682	0.0945	0.0500	
20	0.0102	0.0231	0.0182	0.0224	0.0364		
21	0.0043		0.0045	0.0025	0.0091		
HUMF13A1	3.2	0.0843	0.1620	0.0818	0.0721	0.1667	
	4	0.0291	0.0602	0.0454	0.0299	0.1435	
	5	0.1817	0.2500	0.2136	0.2338	0.3426	
	6	0.3052	0.1805	0.2364	0.3109	0.0972	
	7	0.3575	0.2731	0.3818	0.3259	0.1157	
	8	0.0116	0.0046	0.0136	0.0149	0.0880	
	9			0.0091			
	10					0.0046	
	11		0.0046			0.0046	
	12		0.0092			0.0046	
	13			0.0045	0.0025	0.0139	
	14	0.0102		0.0091	0.0025	0.0093	
	15		0.0278		0.0025	0.0046	
	16	0.0160	0.0093	0.0045	0.0025		
	17	0.0044			0.0025	0.0046	

TABLE 2—Statistical parameters of medico-legal interest.

	Locus	CE	PD	H	P
Portugal	TH01	0.5616	0.9145	0.7764	0.8600
	FES	0.4216	0.8436	0.6900	0.8200
	VWA	0.6219	0.9365	0.8086	0.8400
	F13A1	0.5078	0.8885	0.7375	0.2400
	Comb	0.9528	0.9999		
Moroccan Im.	TH01	0.5881	0.8903	0.7881	0.2500
	FES	0.4987	0.8599	0.7317	0.4100
	VWA	0.6508	0.9359	0.8261	0.2200
	F13A1	0.6058	0.9185	0.7991	0.0400
	Comb	0.9761	0.9999		
North African (Spain)	TH01	0.5923	0.9216	0.7951	0.7700
	FES	0.4672	0.8742	0.7180	0.4100
	VWA	0.6303	0.9208	0.8140	0.0002
	F13A1	0.5209	0.8911	0.7435	0.2000
	Comb	0.9615	0.0999		
S.W. Spain	TH01	0.5750	0.9229	0.7864	0.1500
	FES	0.4315	0.8499	0.6979	0.7310
	VWA	0.6176	0.9348	0.8024	0.1400
	F13A1	0.4978	0.8843	0.7361	0.0700
	Comb	0.9536	0.9999		
West African Black Im.	TH01	0.5120	0.8910	0.7350	0.8661
	FES	0.6080	0.9316	0.8000	0.1083
	VWA	0.6340	0.9404	0.8150	0.0004
	F13A1	0.6260	0.9379	0.8030	0.0127
	Comb	0.9740	0.9999		

CE: chance of exclusion; PD: power of discrimination; H: heterozygosity values; P values for the exact test for Hardy-Weinberg equilibrium.