Hp, GLO and Gc Polymorphisms in the Balearic Islands (Spain): The Mediterranean Blueprint

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INTRODUCTION

Anthropological and historical studies about the Balearic Islands show us that the origin do not come from the Iberian Peninsula,the origin is in the oriental civilization. The Balearic Islands was the point from the comercial routes extends to Europe; in the same way as the others islands in the West Mediterranean. The isolate of the population in the islands, his cultural independence, the high relations among the population even the middle of this century, and his particular historic evolution make interesting to study the hemogenetic origin of the population.

The Balearic Islands are formed by 194 islands. The main are:Mallorca (534.512 p.), Menorca (57.243 p.), Ibiza (59.993 p.) and Formentera (4.222 p.).There are a high density of people near the main city in each island, and the rest are diferent because there are not many peopple;in the main city of the Islands, Palma de Mallorca, are 290.372 p.

The distribution of Hp, Glo and Gc Polymorphisms in the population wich are shown in this work is important as the known of the genetic balearic population as for forensic medicine (paternity testing).

MATERIALS AND METHODS

Fresh blood samples were obtained from 1022 healthy donors who were clasified according to their ancestral origin as pure Balearic islanders(3rd. previous generation). Individual characteristics to have autochthonous islanders were assigned to the different geographical areas selected in the map (Fig.1). After arrival at the laboratory, the serum was separated from blood cells by centrifugation and stored at - 40ºC until tested. The phenotypes Hp, GLO and Gc were determined twice or more.

Hp phenotypes were determined in polycrylamide gels electrophoresis according to Raimond (1964), with a staining technique according to Compton (1976).

GLO phenotypes were determined in agarose-starch gel electrophoresis according Wetterling (1981), with a staining technique according to Parr (1977) with minor modifications.

Gc subtypes were carried out 0.4 mm polyacrylamide gels (PAGIF), T=6.2%, C=3.2% and an ampholine concentration of 2%

Advances in Forensic Haemogenetics 3
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(v/v). Plate dimensions were 200*115 cm. A mixture of Ampholine and Pharmalite pH 4-6, 4-6.5, 4.5-5.4 was used. Polymerization was carried out with ammonium persulfate 1% solution and TEMED.

IEF was performed in Pharmacia equipment (ECPS 3000/150,VH- 1). Focusing was carried out until 4.500 volthours, removing paper after 30 min, with the following maximal conditions: 1500V, 8W (prefocusing) and 5W (focusing), T +8ºC. Gc bands were read after simple precipitation with sulphosalicylic acid.

RESULTS AND DISCUSSION

Table 1 show the distribution of Hp, GLO and Gc phenotypes, respectively, among 1014, 1012 and 1018 auchtouchtonous islanders from Balearic islands. The gene frequencies are the following: Hp 1 .4151, Hp 2 .5848; GLO 1 .3379, GLO 2 .5848; Gc 1F .1674, Gc 1S .5505, Gc 2 .2819. There is a good agreement betwween the observed and the expected frequencies of phenotypes, assuming Hardy-Weinberg equilibrium.

Table 2 show the distribution of Hp, GLO, Gc and Gc gene frequencies in several Mediterranean populations. Contrary to what may be expected, the gene frequencies observed for Hp, GLO and Gc in the Balearic islands are very different to those from other Spanish populations (Barcelona). For Hp: Frequencies similar to those found in Sardinia, as well as in certain Italian populations on the Adriatic coast, and also in the coastal areas of Morocco. For GLO: Frequencies similar to those found in the coastal areas of Northern Africa, as well as in certain areas of Western Turkey. For Gc: Frequencies similar to those in Albanian and Serbo-Croatian populations of Italy.

Table 3 show the statistical analyses (χ^2) of differences in Hp, GLO and Gc gene frequencies between the Balearic islands and several Mediterranean populations.

TABLE 1: Hp, GLO and GC distribution in Balearic Islands

Phenotypes		Observed		Expected	
		n	%	n	%
Hp	1-1	174	17.15	174.79	17.23
Hp	2-1	494	48.71	492.41	48.56
Hp	2-2	346	34.12	346.79	34.2
TOTAL		1014		1013.99	
GLO	1-1	115	11.36	115.57	11.42
GLO	2-1	454	44.86	452.84	44.74
GLO	2-2	443	43.77	443.57	43.83
TOTAL		1012		1011.99	

Gc	1F-1F	30	2.94	28.55	2.8
Gc	1S-1S	309	30.35	308.6	30.31
Gc	2-2	81	7.95	80.91	7.94
Gc	2-1F	95	9.33	96.13	9.44
Gc	2-1S	317	31.13	316.03	31.04
Gc	1F-1S	186	18.27	187.74	18.44
TOTAL		1018		1017.96	

Hp 1*	.4151	Hp 2*	.5848	χ^2 .0105 (1 df) p >.70
GLO 1*	.3379	GLO 2*	.5848	χ^2 .0086 (1 df) p >.90

Gc 1F*	.1674	Gc 1S*	.5505	Gc 2*	.2819	χ^2 .10664 (3 df)p >.99

TABLE 2 : Distribution of Hp^1, GLO^1, Gc^{1F} and Gc^2 gene frequencies in several Mediterranean populations.

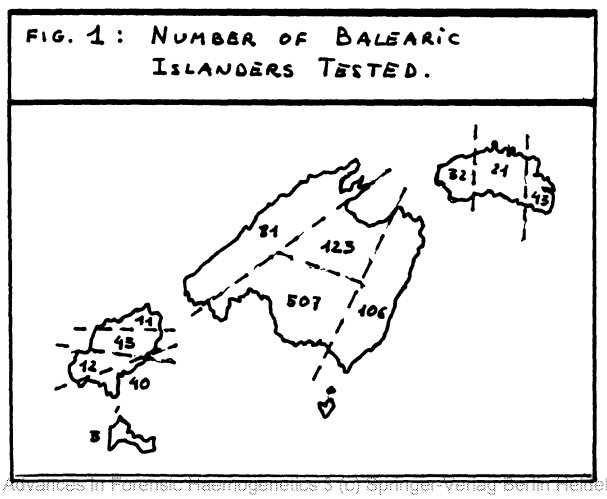
Population	Number tested	Hp^1	Reference
Italy (Adriatic coast)	119	.408	Ritter, 1980
Italy (Sardinia)	440	.401	Ritter, 1980
Italy (Sicily)	107	.397	Ritter, 1980
Greece	370	.45	Kaplanoglou, 1982
Greece (Corfu)	507	.342	Ritter, 1980
Morocco	123	.401	Moullec,1960
Spain (Barcelona)	317	.38	Moral, 1983
Balearic Islands	1014	.415	this study

		GLO^1	
Italy (Napoli)	606	.389	Ranzani, 1979
Bulgary (Balkan)	145	.31	Golan, 1979
North Africa	202	.316	Golan, 1979
Turkey	151	.334	Golan, 1979
Israel(ashkenazi)	191	.301	Golan, 1979
Spain (Barcelona)	625	.445	Huguet,1986
Balearic Islands	1012	.337	this study

Population	Number Tested	Gc^{1F}	Gc^2	Reference
Italy (Serbian)	34	.161	.279	Lindberg,1986
Italy (Albanian)	154	.185	.298	Lindberg,1986
Italy (Sardinia)	316	.187	.259	Petrucci,1986
Greece	300	.13	.20	Kouvatsi,1987
Bulgary	217	.138	.33	Nevo, 1987
North Africa	---	.20	.177	Nevo, 1987
Spain(Barcelona)	839	.131	.32	Gené, 1986
Balearic Islands	1018	.167	.281	this study

TABLE 3: Statistical analyses of differences in Hp, GLO and Gc gene frequencies between the Balearic Islands and several Mediterranean populations.

Communities compared	Hp X^2 (2 d.f.)	P
Balearic vs.Sardinia	.1577	NS
Balearic vs.Sicily	2.8105	p<0.1
Balearic vs.Morocco	1.5695	NS
Balearic vs.Barcelona	10.6179	p<0.005
Balearic vs.Greece	9.9333	p<0.005
Balearic vs.Adriatic coast	.2908	NS
	GLO X^2 (2 d.f.)	P
Balearic vs.North Africa	4.1984	NS
Balearic vs.Turkey	.1213	NS
Balearic vs.Bulgary(Balcans)	7.1751	p<0.005
Balearic vs.Israel(ashkenazi)	13.1632	p<0.001
Balearic vs.Italy	47.4656	p<0.001
Balearic vs.Barcelona	93.2035	p<0.001
	Gc X^2 (5 d.f.)	P
Balearic vs.Albanian	9.6603	NS
Balearic vs.Serbia-Croatia	.7933	NS
Balearic vs.Bulgary	41.0834	p< 0.001
Balearic vs.North Africa	167.2431	p< 0.001
Balearic vs.Greece	192.8765	p< 0.001
Balearic vs.Barcelona	33.8536	p< 0.001



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