

DISTRIBUTION OF Gc, Pi AND Tf SUBTYPES IN SARDINIA (ITALY)

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INTRODUCTION

The differences of values of allelic frequencies of Sardinians compared to those of the rest of Italy, which have been demonstrated for several polymorphisms, are due to the peculiar ethno-geographic situation of the island. The studies of the distribution of the genetic polymorphisms in Sardinia is interesting not only for the geneticist of population or the anthropologist, but it is useful also for the investigations about disputed paternity. This is because the use of the continental average gene frequencies, instead of the insular ones, may cause disparities, sometimes even significant ones, in the calculation of probability of paternity.

This study aims to contribute to the knowledge of the distribution of the allelic frequencies of the Gc, Pi and Tf subtypes in Sardinia.

MATERIALS AND METHODS

Sera were collected from 500 unrelated blood donors originating from Cagliari, Sardinia (all their parents and grandparents were born in Cagliari Province).

Gc, Pi and Tf typing was performed as elsewhere described (Bargagna et al., 1983).

RESULTS AND DISCUSSION

The distribution of phenotypes and gene frequencies estimated by our sample for the Gc, Tf and Pi polymorphism are reported in table 1, 2 and 3 respectively. In table 3, Pi*Rare includes Pi*Z and the other uncommon variants Pi: the gene frequencies are $Pi*Z = 0.001$, $Pi*Var. = 0.001$, respectively. The observed and expected values assuming a Hardy-Weinberg equilibrium were in good agreement.

Tables 4, 5 and 6 compare the Sardinian allelic frequencies to the continental Italy average ones. The majority of data from which we have obtained the average allelic frequencies comes from the papers gathered for the preparation of the second edition of the monograph "The

distribution of some genetic polymorphisms in Italy" edited in 1982 by the G.E.F.I. (Gruppo degli Ematologi Forensi Italiani: see Piazza et al. 1982).

Table 4 shows that in Sardinia Gc*1F has a higher frequency than in any other part of continental Italy, though the examination of the single samples shows a slight overlapping of the continental upper values with lower insular ones (Giari et al., in press).

The same observation can be made about the allele Tf*C2 frequency (see table 5), but in this case the disparity is less marked.

From table 6 appears that the average frequency of Pi*M1 in Sardinia is about 7% less than in continental Italy. Also for this polymorphism we have noted an overlapping which has the same characteristics of that concerning Gc*1F.

In our opinion the present data confirm that is convenient to keep the distinction between the average allelic frequencies of Sardinia and those of the rest of Italy, to calculate the probability of paternity.

TABLES

Table 1: Gc phenotype distribution and gene frequencies in a sample from Cagliari (Sardinia)

Phenotype	Observed		Expected		Gene Frequencies
	n	%	n	%	
1S	143	28.60	146.34	29.27	Gc*1S = 0.541
1F-1S	108	21.60	104.95	20.99	Gc*1F = 0.194
1F	16	3.20	18.82	3.77	Gc*2 = 0.259
2	32	6.40	33.54	6.71	Gc*Rare = 0.006
2-1S	142	28.40	140.12	28.02	
2-1F	53	10.60	50.25	10.05	
1S-Rare	5	1.00	3.25	0.65	
1F-Rare	1	0.20	1.16	0.23	
2- Rare	0	0.00	1.55	0.31	
Rare	0	0.00	0.02	0.00	
Total	500	100.00	500.00	100.00	

chi square : 3.376, 6 d.f., P > 0.20

Table 2: Tf phenotype distribution and gene frequencies in a sample from Cagliari (Sardinia)

Phenotype	Observed		Expected		Gene Frequencies
	n	%	n	%	
C1	290	58.00	282.00	56.40	Tf*C1 = 0.751
C1-2	146	29.20	154.70	30.94	Tf*C2 = 0.206
C1-3	20	4.00	24.78	4.96	Tf*C3 = 0.033
C2	23	4.60	21.21	4.24	Tf*Rare = 0.010
C2-C3	10	2.00	6.79	1.36	
C3	1	0.20	0.54	0.11	
C1-Rare	5	1.00	7.51	1.50	
C2-Rare	4	0.80	2.06	0.41	
C3-Rare	1	0.20	0.33	0.07	
Rare	0	0.00	0.05	0.01	
Total	500	100.00	500.00	100.00	

chi square : 7.7550, 6 d.f., P > 0.20

Table 3: Pi phenotype distribution and gene frequencies in a sample from Cagliari (Sardinia)

Phenotype	Observed		Expected		Gene Frequencies
	n	%	n	%	
M1	195	39.00	188.50	37.70	Pi*M1 = 0.614
M1-2	124	24.80	128.94	25.79	Pi*M2 = 0.210
M1-3	77	15.40	81.05	16.21	Pi*M3 = 0.132
M2	23	4.60	22.05	4.41	Pi*S = 0.042
M2-3	28	5.60	27.72	5.54	Pi*Rare = 0.002
M3	10	2.00	8.71	1.74	
M1-S	22	4.40	25.79	5.16	
M2-S	11	2.20	8.82	1.76	
M3-S	7	1.40	5.54	1.11	
S	1	0.20	0.88	0.18	
M1-Rare	1	0.20	1.23	0.25	
M2-Rare	1	0.20	0.42	0.08	
M3-Rare	0	0.00	0.26	0.05	
S- Rare	0	0.00	0.08	0.02	
Rare	0	0.00	0.00	0.00	
Total	500	100.00	500.00	100.00	

chi square : 3.5366, 10 d.f., P > 20

Table 4: Gc allele frequencies distribution in Italy

ITALY	n	Gc*1F	Gc*1S	Gc*2	Gc*Rare	Ref.
North	2297	.1508	.5707	.2773	.0011	2,5
Center	3451	.1407	.5952	.2634	.0007	2,8
South	398	.1332	.5967	.2701	.0000	2
Continental	6146	.1440	.5862	.2690	.0008	
Nuoro	205	.1660	.5940	.2400	.0000	7
Nuoro	343	.1790	.5350	.2770	.0090	2
Cagliari	316	.1870	.5540	.2590	.0000	7
Cagliari	500	.1940	.5410	.2590	.0060	
Sardinia	1364	.1844	.5506	.2606	.0044	

Table 5: Tf allele frequencies distribution in Italy

ITALY	n	Tf*C1	Tf*C2	Tf*C3	Tf*Rare	Ref.
North	1749	.7810	.1667	.0492	.0031	2,5
Center	2691	.7660	.1735	.0557	.0048	2
South	1007	.7631	.1773	.0546	.0050	2
Continental	5447	.7703	.1719	.0534	.0043	
Sardinia (Cagliari)	500	.7510	.2060	.0330	.0100	

Table 6: Pi allele frequencies distribution in Italy

ITALY	n	Pi*M1	Pi*M2	Pi*M3	Pi*S	Pi*Z	Pi*Rare	Ref
North	1973	.7082	.1828	.0697	.0243	.0075	.0042	2,4
Center	3253	.6800	.1791	.0999	.0300	.0054	.0054	2,4,9
Continental	5226	.6907	.1805	.0885	.0278	.0062	.0049	
Nuoro	205	.6530	.3100*		.0300	.0070	.0000	7
Cagliari	316	.6110	.3300*		.0550	.0040	.0000	7
Cagliari	500	.6140	.2100	.1320	.0420	.0010	.0010	
Sardinia	1021	.6209	.3319*		.0436	.0031	.0005	

(*) Pi*M2 + Pi*M3 + Pi*M4

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