Z Rechtsmed (1984) 92:307–310

Zeitschrift für
Rechtsmedizin

Kasuistiken / Casuistries

Group-specific Component Subtypes Along the Italian Peninsula

V. L. Pascali[1], R. Petrucci[2], and P. Auconi[3]

[1] Istituto di Medicina Legale e delle Assicurazioni, Università Cattolica del S. Cuore, Via Pineta Sacchetti 644, I-00168 Roma, Italy
[2] Istituto di Genetica, Università "La Sapienza", Roma
[3] Divisione di Pediatria, Ospedale di Arezzo

Summary. Nine areas in Italy were analyzed for the frequencies of the Gc system (group-specific component). No significant discrepancy was found among their frequencies as they resulted after isoelectric focusing (IEF). When more accurately analyzed, gene frequencies revealed a microheterogeneity affecting one sample (city of Bari) against eight tightly clustered values.

Key words: Group-specific component (Gc) – Isoelectric focusing (IEF)

Zusammenfassung. Neun italienische Gebiete wurden aufgrund ihrer Abweichungen der gruppenspezifischen Komponente (Gc) untersucht. Keine bedeutende Abweichung wurde unter ihren Frequenzen, wie sie nach isoelektrischer Fokussierung (IEF) auftreten, gefunden. Bei näherer Betrachtung zeigte sich eine Abweichung der Genfrequenzen an einem Beispiel (Bari) gegenüber acht nahe beieinanderliegenden Werten.

Schlüsselwörter: Gruppenspezifische Komponente (Gc) – isoelektrische Fokussierung (IEF)

Since the heterogeneity of *Gc*[1] was disclosed by the studies of Constans and Viau (1977), the polymorphism of the group-specific component (Gc) has been studied intensively in the main racial groups. The vast array of population frequencies so far published has shown that the allele proportions are somewhat similar in white people from North and Central Europe (Cleve et al. 1978; Kühnl et al. 1978).

In Italy relatively few studies dealing with the Gc frequencies have appeared (Cleve et al. 1978; Petrucci and Congedo 1983), and these can hardly be considered systematic. Moreover, interest in Gc distribution has arisen in view of its use in the field of paternity tests, when reference data are needed for the biostatistics of kinship. Hence we have undertaken a broader inquiry into the Gc system, and this paper deals with its subtype distribution in 1,185 subjects randomly sampled from nine geographic areas along the peninsula.

Offprint requests to: Dr. Vincenzo L. Pascali (address see above)

Materials and Methods

Sera were obtained by venipuncture and cell sedimentation without anticoagulant, and stored at −25° C. Isoelectric focusing was performed on polyacrylamide flat beds (T = 5%) in the range of pH 4–6.5 immediately after thawing.

Subtypes were separated by applying 1,300 V for up to 3 h. We used the simple immersion of focused gels in 10% sulfosalicylic acid (W/V in water) to detect the pattern of bands, and gels were then observed under an intense source of light against a dark background.

Results and Discussion

Observed and expected types are shown in Table 1. Table 2 lists the Gc gene frequencies. It can be seen clearly that there is an even distribution of the allele products, since frequencies for localities even at some distance from each other generally fit well. The degree of genetic heterogeneity between groups has been calculated by the chi-square analysis. Its value ($\chi^2_{40} = 29.94$, $0.9 > P > 0.8$) is able to exclude relevant discrepancies.

Nevertheless, the goodness of fit does not rule out the existence of either microheterogeneities or clusters among the frequencies analyzed above. To make this point clear, Fig. 1 outlines our allele frequencies, Gc^{1S}, Gc^{1F}, and Gc^{2} being separately plotted around their own mean values. As can be seen in Fig. 1,

Table 1. Gc phenotypes among 1,185 individuals from nine areas in Italy (expected values in parentheses)

Area	No.	1S	1F	2	1F-1S	2-1F	2-1S	χ^2_3
Genova	71	25 (24.21)	3 (2.05)	5 (4.30)	13 (14.10)	5 (5.94)	20 (20.40)	0.822
Verona	100	32 (33.64)	4 (3.06)	5 (6.00)	20 (20.30)	7 (8.57)	32 (28.43)	1.996
Ferrara	126	45 (45.21)	3 (3.51)	7 (6.90)	26 (25.21)	10 (9.85)	35 (35.32)	0.106
Arezzo	244	99 (101.67)	2 (2.88)	15 (14.75)	38 (34.21)	11 (13.03)	79 (77.46)	1.109
Roma	104	43 (43.81)	2 (1.63)	3 (5.31)	15 (16.87)	7 (5.88)	34 (30.50)	1.926
Marsica	142	59 (60.91)	2 (2.28)	8 (6.77)	27 (23.58)	5 (7.86)	41 (40.60)	1.858
Napoli	115	43 (45.21)	2 (1.94)	6 (6.79)	20 (18.75)	6 (7.27)	38 (35.04)	0.757
Bari	121	33 (33.99)	2 (2.37)	11 (13.18)	18 (17.96)	12 (11.18)	45 (42.32)	0.617
Lecce	162	67 (62.97)	4 (2.72)	14 (9.88)	25 (26.18)	9 (10.37)	43 (49.88)	2.862

Table 2. Gc gene frequencies in Italy

Area	Gc^{1S}	Gc^{1F}	Gc^{2}
Genova	0.584±0.041	0.170±0.031	0.246±0.036
Verona	0.580±0.034	0.175±0.027	0.245±0.030
Ferrara	0.599±0.010	0.167±0.023	0.234±0.027
Arezzo	0.645±0.022	0.109±0.014	0.246±0.019
Marsica	0.655±0.028	0.127±0.020	0.218±0.024
Roma	0.649±0.033	0.125±0.023	0.226±0.029
Bari	0.530±0.032	0.140±0.022	0.330±0.030
Napoli	0.627±0.032	0.130±0.022	0.243±0.028
Lecce	0.623±0.027	0.130±0.019	0.247±0.024

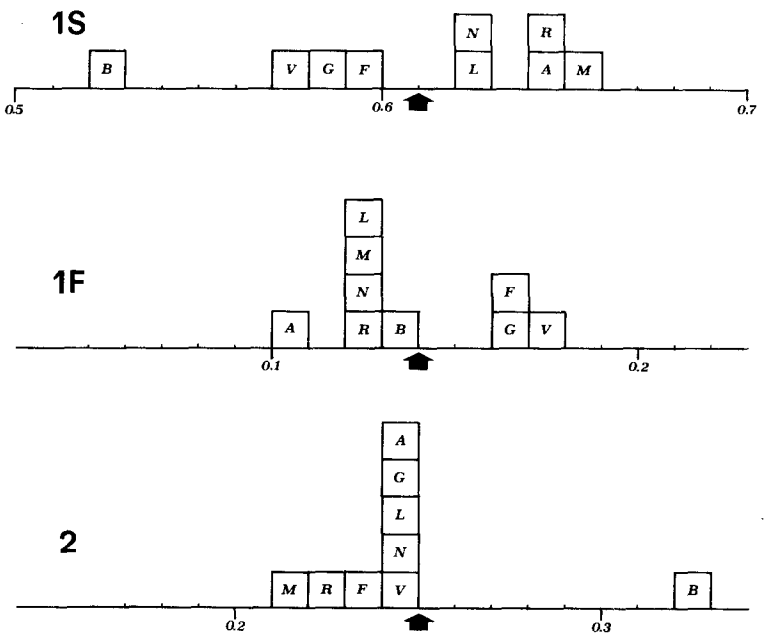

Fig. 1. Gc gene frequencies in different areas of Italy. B, Bari; A, Arezzo; V, Verona; G, Genova; F, Ferrara; N, Napoli; L, Lecce; R, Roma; M, Marsica (an area in the province of Avezzano)

at least one locality (Bari) shows differences in the frequency of Gc^{1S} and Gc^{2}, whereas most samples exhibit roughly clustered values. The unlike allele proportion affecting Bari district is properly stressed when in turn compared with that of each sample (at lower limit of fit: Bari vs Marsica marks off $\chi^2_5=11.12$ and $P<0.05$).

With the Italian frequencies reported above, the isolated theoretical chance of exclusion of paternity rises to 0.28 on the average, ranging from 0.26 (Arezzo) to 0.31 (Verona).

References

Cleve H, Patutschnick W, Nevo S, Wendt GG (1978) Genetic studies on the Gc subtypes. Hum Genet 44:117–122

Constans J, Viau M (1977) Group-specific component: evidence for two subtypes of the Gc^1 gene. Science 198:1070–1071

Kühnl P, Spielmann W, Loa M (1978) An improved method for the identification of Gc^1 subtypes (group-specific component) by isoelectric focusing. Vox Sang 35:401–404

Petrucci R, Congedo P (1983) Genetic studies of Gc (vitamin D-binding globulin) polymorphism in the population of Latium (Italy). J Hum Evol 12(5):439–442

Received November 15, 1983