Int J Leg Med (1992) 104:365–366

International Journal of
Legal Medicine

Short communication

Group-specific component (GC) polymorphism in Cádiz (southern Spain)

M. A. Vizcaya, J. L. Romero, J. J. Gamero, and Maria I. Arufe

Cathedra of Legal Medicine and Toxicology, Faculty of Medicine, University of Cádiz, E-11003 Cádiz, Spain

Received September 17, 1991 / Received in revised form October 31, 1991

Summary. The genetic polymorphism of group-specific component (GC) was analysed in a sample of 443 healthy unrelated subjects of both sexes resident in the province of Cádiz (Southern Spain). Isoelectric focusing was carried out in polyacrylamide gels followed by staining with coomassie blue R 250. The estimated gene frequencies were as follows: GC*1S = 0.6185; GC*1F = 0.1162; GC*2 = 0.2652.

Key words: Group-specific component – Isoelectric focusing – Subtyping – Population genetics

Zusammenfassung. Der genetische Polymorphismus GC (group-specific component) wurde in einer Stichprobe von 443 gesunden, unverwandten Personen beiderlei Geschlechts aus der Region der Provinz von Cádiz (Südspanien) untersucht. Isoelektrische Fokussierung wurde in Polyacrylamid-Gelen durchgeführt mit nachfolgender Anfärbung mit Coomassie Blau R 250. Die geschätzten Gen-Frequenzen waren wie folgt: GC1S = 0,6185; GC1F = 0,1162; GC2 = 0,2652.

Schlüsselwörter: Gruppenspezifische Komponente – Isoelektrische Fokussierung – Subtypisierung – Populationsgenetik

Introduction

The GC protein displays genetic polymorphism with 3 common phenotypes GC1; GC2–1; GC2. With the introduction of isoelectric focusing (IEF) this was extended from 2 to 3 common alleles due to the discovery of the GC*1 subtypes, GC*1F and GC*1S (Constans and Viau 1977). These alleles allow 6 common phenotypes, GC1F, GC1S, GC1F–1S, GC2–1S, GC2–1F and GC2 to be identified.

Materials and methods

In this study we have used 443 blood samples from healthy individuals resident in the province of Cádiz. Their number was established in proportion to the population size of each municipality.

The method of IEF used follows the parameters laid down by Carracedo and Concheiro (1983). The pH range used was 4–6.5 Ampholine (LKB, Bromma, Sweden) at a concentration of 4%.

Table 1. GC phenotypes and gene distribution in Cádiz

Phenotypes	Observed		Expected		Allele frequencies
	n	%	*n*	%	
1F–1F	8	1.8059	5.99	1.3515	
1F–1S	60	13.5440	63.71	14.3807	GC*1F = 0.1162528
1F–2	27	6.0948	27.32	6.1669	GC*1S = 0.6185102
1S–1S	170	38.3747	169.47	38.2555	GC*2 = 0.2652370
1S–2	148	33.4086	145.35	32.8104	
2–2	30	6.7720	31.17	7.0351	
Total	443	100.0000	443.00	100.0000	

$\chi^2 = 0.98973$; $df = 3$; $0.9 > P > 0.75$

Table 2. European distribution of GC* allele frequencies

Population	*n*	GC*1S	GC*1F	GC*2	References
Belgium					
Liege	267	0.54	0.16	0.29	Hoste (1979)
France					
Pyrenean	290	0.51	0.08	0.41	Constans et al. (1978)
Germany					
Munich	440	0.59	0.14	0.26	Cleve et al. (1978)
Spain					
Basques	190	0.57	0.09	0.34	Constans et al. (1985)
Cádiz	443	0.61	0.11	0.26	This study
Sweden	3394	0.61	0.14	0.25	Svenson and Hjalmarsson (1981)

Results and discussion

The results for the Group-specific component system among the population of the province of Cádiz, as well as the Hardy-Weinberg equilibrium are shown in Table 1.

The estimated gene frequencies are slightly different to those described in several provinces of Spain but they are not significant. Likewise, they are not significantly different from most other European populations, except for Pyreneans and Basques (Table 2).

References

Carracedo A, Concheiro L (1983) Distribution of the Pi, Tfc and Gc subtypes in Galicia (North West Spain). Z Rechtsmed 90: 153–158

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

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

Constans J, Viau M, Cleve H, Jaeger G, Quilici JC, Palisson MJ (1978) Analysis of the Gc polymorphism in human populations by isoelectric focusing on polyacrylamide gels. Demonstration of subtype of the Gc allele and of additional Gc variants. Hum Genet 41:53–60

Constans J, Hazout S, Garruto RM, Gajdusek DC, Spees EK (1985) Population distribution of the human vitamin D binding protein: anthropological considerations. Am J Phys Antropol 68:107–122

Hoste B (1979) Group-specific component (Gc) and transferrin (Tf) subtypes ascertained by isoelectric focusing: a simple non-immunological staining procedure for Gc. Hum Genet 50:75–79

Svensson M, Hjalmarsson K (1981) Distribution of Gc subtypes by isoelectric focusing in Sweden. 9. Internationale Tagung der Gesellschaft für forensische Blutgruppenkunde, Bern 29.9.–3.10., pp 559–562