

Haptoglobin subtypes in Northern Germany (Hamburg)

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Summary. The distribution of the Hp subtypes (investigated by isoelectric focusing) in 1725 unrelated adults from Hamburg and surrounding areas is reported. Allelic frequencies: HP*1F = 0.1466, HP*1S = 0.2466, HP*2FF = 0.0040, HP*2FS = 0.5724, HP*2SS = 0.0301. The exclusion efficiency in 230 paternity cases is discussed.

Key words: Haptoglobin subtyping – Isoelectric focusing

Zusammenfassung. Die Hp-Phänotypenverteilung (untersucht mittels IEF) in Hamburg und Umgebung wird mitgeteilt ($N = 1725$ nicht verwandte Personen). Allelfrequenz: HP*1F = 0,1466, HP*1S = 0,2466, HP*2FF = 0,0040, HP*2FS = 0,5724, HP*2SS = 0,0301. Bei 230 Vaterschaftsausschlüssen wird die Effektivität der Hp-Subtypisierung dargestellt.

Schlüsselwörter: Haptoglobin-Subtypisierung – Isoelektrische Fokussierung

Introduction

Various techniques for Hp-subtyping have been described and many studies of population genetic data are available [2, 5, 7, 8]. A review has been recently published by Teige et al. (1992) [9] which includes only few data from Germany (e.g. Berlin and the Rhine-Ruhr area). We present the distribution of haptoglobin subtypes and allele frequencies found in a population of unrelated adults in northern Germany (Hamburg and its surroundings) in comparison with other populations from central and northern Europe.

Material and methods

1725 serum samples from unrelated adults (842 blood alcohol samples and 883 from paternity cases) were subtyped by isoelectric focusing in polyacrylamide gels. The samples were simultaneously investigated by conventional starch gel electrophoresis.

Preparation, subsequent reductive molecular cleavage and isoelectric focusing of Hp was performed exactly according to the method described previously by Patzelt and Schröder (1985).

The efficiency of the Hp subtyping was evaluated in 230 cases of paternity exclusions.

Results

Band patterns of Hp subtypes are presented in Figure 1.

Table 1 shows the observed and expected distribution of the Hp subtypes and the allele frequencies in our population sample of 1725 unrelated adults from Hamburg and surrounding areas. We found an increase in the exclusion chance in paternity cases from 18% by conventional starch gel electrophoresis to 29% by IEF.

Discussion

The distribution of haptoglobin phenotypes in our material corresponds to the assumption of Hardy-Weinberg equilibrium and an autosomal-codominant inheritance. There is a good agreement between the observed and expected frequencies of the phenotypes. In our material

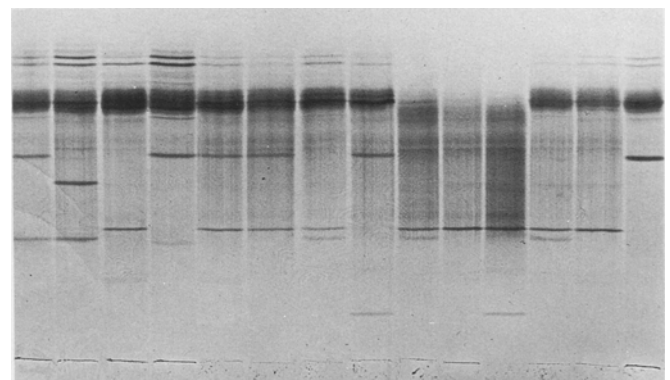


Fig. 1. Hp subtypes as revealed by PAGE-IEF. 1S-1F(1), 1F-2SS(2), 2FS(3, 10, 13), 1S (4, 14), 1S-2FS(5, 6), 1F-2FS(7, 9, 12), 1S-2FF(8), 2FF-2FS (11)

Table 1. Hp subtypes and allele frequencies in 1725 unrelated adults in northern Germany (Hamburg)

Phenotype	Observed		Expected		Allele frequencies
	<i>n</i>	%	<i>n</i>	%	
1F	41	2.3768	37.1047	2.1510	
1F-1S	129	7.4728	124.7778	7.2335	
1S	113	6.5507	104.9559	6.0844	
1F-2FF	1	0.0579	2.0527	0.1190	
1F-2FS	272	15.7681	289.6637	16.7921	
1F-2SS	22	1.2735	15.2524	0.8842	1F = 0.1466
1S-2FF	4	0.2318	3.4517	0.2001	1S = 0.2466
1S-2FS	469	27.1884	487.1641	28.2414	2FF = 0.0040
1S-2SS	23	1.3333	25.6507	1.4870	2FS = 0.5724
2FF	1	0.0579	0.0276	0.0016	2SS = 0.0301
2FF-2FS	5	0.2898	8.0109	0.4646	0.9997
2FF-2SS	2	0.1159	0.4209	0.0244	
2FS	587	34.0289	565.3049	32.7713	
2FS-2SS	55	1.1884	59.5332	3.4512	
2SS	1	0.0579	1.5663	0.0908	
	1725	99.9975	1724.9375	99.9966	

Chi² = 7.5099, *d.f.* 9; 0.6 > *P* > 0.5

Table 2. Hp allele frequencies in various populations

Population	<i>n</i>	HP*1F	HP*1S	HP*2FS	HP*2SS	HP*2FF	Reference
Germany (Hamburg)	1725	0.1466	0.2466	0.5724	0.0301	0.0040	This material
Germany (Berlin)	1275	0.1471	0.2502	0.5753	0.0251	0.0020	Patzelt and Schröder 1985
Germany (Lower Saxony)	1500	0.1537	0.2523	0.5620	0.0290	0.0030	Rothämel et al. 1989
Germany (Rhine-Ruhr)	1035	0.1391	0.2575	0.5831	0.0188	0.0014	Bertrams et al. 1988
Germany (Tübingen)	182	0.144	0.254	0.574	0.024	0.0004	Zischler et al. 1987
Germany (Stuttgart)	1485	0.1582	0.2168	0.6	0.0202	0.004	Härle et al. 1992
Norway	6668	0.158	0.220	0.578	0.040	0.004	Teige et al. 1992
Denmark	2184	0.151	0.241	0.565	0.040	0.002	Thyman (from Teige et al. 1992)
Sweden	564	0.156	0.231	0.571	0.041	0.001	Hjalmarsson 1988
Switzerland (Bern)	1266	0.126	0.2389	0.5829	0.0423	0.0099	Scherz et al. 1990
Switzerland (Lausanne)	500	0.147	0.249	0.567	0.034	0.003	Dimo-Simonin et al. 1990

we observed all theoretically possible Hp phenotypes. Hp variants, however, were not observed.

The Hp allele frequencies found in northern Germany are similar to the frequencies reported from other countries in northern and central Europe (see Table 2).

The paternity exclusion efficiency in our material (29%) is also in good agreement with literature data for adjacent regions (33% for Berlin [5]; 34% for Hannover and Lower Saxony [6]).

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