HAPTAGLOBIN SUBTYPES IN A POPULATION FROM SOUTH WEST GERMANY

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INTRODUCTION

Haptoglobin (HP) is a polymorphic marker whose main three phenotypes HP 1, HP 2-1, and HP 2 were first separated by Smithies (1955) using starch gel electrophoresis. Subtyping of haptoglobin by isoelectric focusing has been shown to lead to an isolated exclusion rate of up to 33 % in paternity assessment (Thymann et al 1990). Despite this high value of the HP subtype polymorphism it is still rarely included in routine testing because of the time consuming steps in HP purification.

The substitution of an immunoprecipitation technique (Scherz et al. 1990) for the more laborious ion exchange chromatographic methods overcomes this limitation. Using this technique we have determined the frequencies of HP subtypes in a large population sample from South West Germany.

MATERIAL AND METHODS

1487 sera from a random population sample of unrelated adult German nationals who had participated in a 1985 cardiovascular health survey in the city of Stuttgart were examined. Prior to analysis, samples had been stored at -20^{0} C for five years. HP subtypes were determined by the method of Scherz et al. (1990). For a cross-validation of the new technique HP phenotypes were determined by starch gel electrophoresis according to Smithies (1955).

RESULTS AND DISCUSSION

Haptoglobin subtypes could be identified for 1485 out of 1487 samples (99,9 %). In two samples, the HP subtype could not be determined due to irregular band patterns which did not match commen subtypes. In one case sample deterioration was the likely cause. The second sample was classified as HP 2 in conventional HP typing. According to its band pattern in HP subtyping, we cannot rule out the possibility of an alpha-2-variant not yet described.

In eight other samples, initial discordance between the two methods could upon repeat analysis be traced to inferior resolution of starch gel electrophoresis.

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All common HP subtypes except the heterozygous HP 2FF-2SS and the both homozygous HP 2FF and HP 2SS were observed in our sample. Expected and observed frequencies of HP subtypes (Tab. 1) were in good agreement as to be expected under the Hardy-Weinberg law.

Table 1: Expected and observed frequencies of HP subtypes (n=1485)

HP SUBTYPE	OBSERVED		EXPECTED
	n	percent	n
1F	29	1.95	37.19
1F-1S	102	6.87	101.91
1S	70	4.71	69.82
1F-2FF	3	0.20	2.06
1F-2FS	299	20.13	282.16
1F-2SS	8	0.54	9.49
1S-2FF	4	0.27	2.82
1S-2FS	386	25.99	386.62
1S-2SS	12	0.81	13.01
2FF	0	0.00	0.03
2FF-2FS	6	0.40	7.80
2FF-2SS	0	0.00	0.26
2FS	526	35.42	535.20
2FS-2SS	40	2.69	36.02
2SS	0	0.00	0.61
Total	1485	100.00	1485

χ^2 goodness of fit 5,96 with 14 degrees of freedom, p = 0,97

Calculated frequencies for HP alleles were: HP*1F=0.1582, HP*1S=0.2168, HP*2FF=0.004, HP*2FS=0.60, HP*2SS=0.0202. Table 2 contrasts the observed frequencies with reports from the literature.

Table 2: Comparison of observed HP allele frequencies with reports from the literature

POPULATION	N	HP*1F	HP*1S	HP*2FF	HP*2FS	HP*2SS	REFERENCE
NORWAY	3318	0.16	0.226	0.004	0.572	0.037	Teige et al. 1988
SWEDEN	564	0.156	0.231	0.001	0.571	0.041	Hjalmarsson 1988
DENMARK	2184	0.151	0.241	0.002	0.565	0.040	Thymann et al. 1990
GERMANY							
Berlin	1275	0.1471	0.2502	0.002	0.5753	0.0251	Patzelt a.Schröder 1985
Lower Saxony	1500	0.1537	0.2523	0.003	0.562	0.029	Rothämel et al. 1989
Rhine-Ruhr	1035	0.1391	0.2575	0.0014	0.5831	0.0188	Bertrams et al. 1988
Stuttgart	1485	0.1582	0.2168	0.004	0.6	0.0202	own data
Southwest	182	0.144	0.254	0.004	0.574	0.024	Zischler et al. 1987
SWITZERLAND							
Berne	1266	0.126	0.2389	0.0099	0.5829	0.0423	Scherz et al. 1990
Lausanne	500	0.147	0.249	0.003	0.567	0.034	Dimo-Simonin et al.1990
FRANCE							
Southwest	202	0.139	0.245	0.012	0.547	0.045	Shibata et al. 1982
SPAIN	317	0.142	0.238	0.006	0.621	0.002	Moral and Panadero 1983
HUNGARY	675	0.1185	0.2207	0.0037	0.6555	0.0015	Hevér and Hajpál

To our experience, haptoglobin isolation by immunoprecipitation and isoelectric focusing as proposed by Scherz et al.(1990) is a fast, easy, and reliable technique for HP subtyping. The possibility to process large sample sizes rapidly renders this method into a valuable tool for population studies as well as for forensic investigations. Even smaller laboratories have now the opportunity to include this marker system in the routine paternity testing. The storage of sera over an extended period of up to five years at -20^{O} C does apparently not grossly affect sample quality for Hp subtyping.

The allele frequencies for haptoglobin observed in a population from South West Germany are in close agreement with the frequencies reported for other European populations.

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