

Allele frequency distributions of three STR-loci in a population from Northern Germany

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Systems and loci: HUMVWA (12p12-12pter)
HUMFES/FPS (15q25-25qter)
HUMF13B (1q31-q32.1)

Population and sample size: Northern Germany,
N = 307 (VWA), 387 (FES), 289 (F13B)

Methods: Primers: HUMVWA (Kimpton et al. 1992)
HUMFES/FPS (Polymeropoulos et al. 1991)
HUMF13B (Nishimura and Murray 1992)

PCR amplification conditions: Möller et al. 1994

Electrophoretic methods: non denaturing polyacrylamide gel electrophoresis (6% T, 1.5% C (HUMFES/FPS) or 6% T, 4.5% C (HUMVWA and HUMF13B), 0.5 mm), 60 mM formate (pH 9.0), 20 cm separation distance, running conditions: 600 V, 25 mA, 10 W until the bromophenolblue front reaches the anode, visualization by silver staining according to Budowle et al. 1991.

Allele designation: according to the repeat number. Alleles 10a and 11a of HUMFES/FPS are designated according to Möller et al. 1994.

Results:

Observed genotypes of HUMVWA

Gen.	Obs.	Gen.	Obs.	Gen.	Obs.	Gen.	Obs.
14/14	7	15/16	9	16/19	9	18/19	17
14/15	6	15/17	26	16/20	2	18/20	2
14/16	8	15/18	16	17/17	31	19/19	3
14/17	10	15/19	5	17/18	32	19/20	3
14/18	14	16/16	11	17/19	12		
14/19	5	16/17	33	17/20	1		
14/20	1	16/18	31	18/18	13		

Allele frequencies of HUMVWA

Allele	Frequency	Allele	Frequency	Allele	Frequency
13	-	16	0.186	19	0.093
14	0.094	17	0.287	20	0.015
15	0.101	18	0.225	21	-

P-value (exact test):	0.063 +/- 0.007
Observed Heterozygosity:	0.788
Allelic diversity:	0.806 +/- 0.044
Discrimination power:	0.93
Mean exclusion chance:	0.62

Exact-test: Guo and Thompson 1992, Allelic diversity: Nei 1978, Discrimination power: Jones 1972, Mean exclusion chance: Krüger et al. 1968

Genotype frequencies of HUMFES/FPS

Gen.	Obs.	Gen.	Obs.	Gen.	Obs.	Gen.	Obs.
8/10a	2	10a/10a	4	10/10	2	11a/12	7
8/10	1	10a/10	62	10/11a	1	11/11	68
8/11a	1	10a/11a	38	10/11	27	11/12	74
8/11	10	10a/11	4	10/12	10	11/13	13
8/12	4	10a/12	2	10/13	2	12/12	17
9/12	1	10a/13	1	11a/11	9	12/13	5

Allele frequencies of HUMFES/FPS

Allele	Frequency	Allele	Frequency	Allele	Frequency
8	0.023	10	0.066	12	0.224
9	0.001	11a	0.028	13	0.031
10a	0.199	11	0.428		-

P-value (Exact test):	0.951 +/- 0.0059
Observed Heterozygosity:	0.726
Allelic diversity:	0.722 +/- 0.045
Discrimination power:	0.88
Mean exclusion chance:	0.49

Genotype frequencies of HUMF13B

Gen.	Obs.	Gen.	Obs.	Gen.	Obs.	Gen.	Obs.
6/6	2	7/8	2	8/9	26	9/10	54
6/8	15	7/9	1	8/10	54	9/12	1
6/9	11	7/10	4	8/11	1	10/10	50
6/10	28	8/8	19	9/9	20	10/11	1

Allele frequencies of HUMF13B

Allele	Frequency	Allele	Frequency	Allele	Frequency
6	0.100	9	0.230	12	0.002
7	0.012	10	0.417		
8	0.235	11	0.004		

P-value (Exact test):	0.872 +/- 0.009
Observed Heterozygosity:	0.685
Allelic diversity:	0.709 +/- 0.052
Discrimination power:	0.87
Mean exclusion chance:	0.46

References

1. Budowle B, Chakraborty R, Giusti AM, Eisenber AJ, Allen RC (1991) Analysis of the variable number of tandem repeats locus D1S80 by the polymerase chain reaction followed by high resolution polyacrylamide gel electrophoresis. *Am J Hum Genet* 48:137-144
2. Guo SW, Thompson EA (1992) Performing the exact test of Hardy-Weinberg proportion for multiple alleles. *Biometrics* 48:361-372
2. Jones DA (1972) Blood samples: Probabilities of discriminations. *J Forensic Sci Soc* 12:355-359
3. Kimpton CP, Walton A, Gill P (1992) A further tetranucleotide repeat polymorphism in the vWF gene. *Hum Mol Gen* 1:28
4. Krüger J, Fuhrmann W, Lichte KH, Steffens C (1968) Zur Verwendung der sauren Erythrocytenphosphatase bei der Vaterschaftsbegutachtung. *Dtsch Z Gerichtl Med* 64:127-146
5. Möller A, Meyer E, Brinkmann B (1994) Different types of structural variation in STRs: Hum-FES/FPS, HumVWA und HumD21S11. *Int J Leg Med* 106:319-323
6. Nei M (1978) Estimation of average heterozygosity and genetic distance from a small number of individuals. *Genetics* 89:583-590
7. Nishimura DY, Murray JC (1992) A tetranucleotide repeat for the F13B locus. *Nucleic Acids Res* 20:1167
8. Polymeropoulos MH, Rath DS, Xiao H, Merrill RM (1991) Tetranucleotide repeat polymorphism at the human c-fes/fps proto-oncogene (FES). *Nucleic Acids Res* 19:4018