

CLARIFICATION OF A PATERNITY CASE WITH THE MOTHER, TWO CHILDREN
AND THE MOTHER OF THE PUTATIVE FATHER

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In a paternity case, the biologic fatherhood of a deceased man with respect to two children was questionable; for solving this question, only the following individuals could be tested: two children, the mother of the children and the mother of the deceased putative father - the father of the putative father was also already dead.

From a theoretical point of view, it is not possible to exclude a putative father from the paternity to a single child if only his mother (and not his father) can be included in the investigations as the paternal allele of the child could have been present in the father of the putative father. In case that two children are involved, it is possible that one allele (or haplotype) of the putative father can be deduced from the phenotype of his mother and that the children inherited two other alleles (or haplotypes) from their true father; such informations, however, can only be obtained by investigating genetic systems with at least 3 alleles (or haplotypes). If so, it would be important to compute the probability of grandmotherhood of the mother of the putative father in order to see whether or not there are some hints for a kinship with child 1, child 2, both or neither of both children. A paternity case demonstrating these problems is presented in the following.

The results of the phenotyping for several markers (in order to compute the biostatistics, systems with 2 alleles have also been included) are presented in Table 1.

From this table, it can be seen that the deceased putative father cannot be the biological father of both children because of the results in the systems MS43/HinfI and HLA-AB:

- in MS43/HinfI, child 1 inherited a paternal band with 10,5 kb, child 2 a paternal band with 5,4 kb or 11 kb, while the putative father must possess the gene coding for a 13,5 kb band, and

- in HLA-AB, child 1 inherited the paternal haplotype A28,B51, child 2 the paternal haplotype A3,B7 (or AX,B7), while the father must carry on one chromosome the genes defining A2,B15 or A2,B17 or A9,B15 or A9,B17.

From these data, it is clear that the putative father cannot be the biologic father of both children.

The computation of the plausibility of grandmotherhood according to Essen-Möller of the paternal grandmother (W) to the two children of this case gave the following results: W for child 1 = 0.0003% and W for child 2 = 72%. As the latter value is a typical value for such cases, there are no indications that the paternal grandmother is not the biological grandmother of child 2; the odds for the hypothesis that she is the grandmother of child 2 and not of child 1 (excluding the possibility that she is not related to both children) are 240000:1.

This case shows clearly that the use of genetic polymorphisms with a high polymorphism, i.e. the HLA system and DNA polymorphisms, can solve complex paternity problems, especially cases in which the putative father is not available for direct testing and in which his genotype cannot be completely reconstructed.

Table 1 Phenotypes of the individuals involved in this case

	mother	child 1	child 2	pat.grandmother
ABO	A1	O	A1	O
RH	ddccee	DCcee	ddccee	DCcee
MNS	MNs	MNs	MNs	NSs
P1	P2	P2	P2	P2
KEL	K+	K-	K+	K-
FY	a+b+	a+b-	a+b+	a+b+
JK	a-b+	a-b+	a+b+	a+b+
LU	a-b+	a-b+	a-b+	a-b+
HP	1	2-1	1	2
C3	2-1	2	1	2-1
GC	2-1S	1F-1S	2-1S	1S
PI	3-2	3-2	3-1	1
GM	1,-2,4,5	-1,-2,4,5	-1,-2,4,5	1,-2,4,5
ACP1	B	AB	B	AB
ADA	1	1	1	1
6PGD	1	1	1	1
GPT	1	2-1	2-1	2-1
ESD	1	1	1	1
PGM1	1	1	2-1	2-1
HLA	A3,10; B13,38	A3,28; B13,51	A3; B7,13	A2,9; B15,17
TBQ7/HinfI	3,3-2,4	3,3-3,3	3,3-2,1	4,8-2,1
YNH24/HinfI	3,3-3,3	3,5-3,3	3,3-2,8	2,8-2,5
PH30/HinfI	6-3,2	9-6	3,2-2,7	5,2-2,7
MS31/HinfI	11-7,5	11-8,4	11-11	11-11
MS43/HinfI	11-5,4	10,5-5,4	11-5,4	13,5-13,5
G3/HinfI	10-4,5	4,5-4,5	25-10	25-6