CASE REPORT

Pravatchai W. Boonlayangoor,[1] *Ph.D.*

True Paternity or Exclusion: Analysis in the Case of a Deceased Party

REFERENCE: Boonlayangoor, P. W., "**True Paternity or Exclusion: Analysis in the Case of a Deceased Party,**" *Journal of Forensic Sciences,* JFSCA, Vol. 34, No. 3, May 1989, pp. 703–707.

ABSTRACT: State-of-the-art technology can play a significant role in solving forensic and parentage problem cases if an expert scientist is employed in the analysis and interpretation of test results. As presented in this paper, there are differences of opinion among witnesses examining the same evidence, therefore illustrating the need for careful examination of evidence even by the expert.

KEYWORDS: forensic science, jurisprudence, paternity, genetic typing, witnesses

Case Report

This case was eventually settled in the Appellate Court of Cook County, State of Illinois, in May 1987. The subject was a matter ruled on by the court in a petition to amend heirship filed on behalf of an illegitimate child (I-C) by his mother (BB-1). The petition alleges that I-C is the son of the deceased father (AA-2). The contention that the decedent (AA-2) is the father of the illegitimate child is denied by the administrator of the decedent's estate. The sole heir of decedent was declared to be his son, a legitimate child (L-C). L-C was born to decedent and his ex-wife (WX-1). Petitioner sought to have an equal share of the (AA-2) estate. After preliminary motions by the petitioner, the trial commenced in the circuit court granting the petitioner's motions for a blood test to verify parentage.

Because of the fact that the alleged father is deceased and that the court granted the petitioner's motions for a blood test, all the parties involved in this case, such as grandparents for both parties, were subjected to blood tests. The results of the blood tests as shown in Tables 1 and 2 were presented to the counselors for both parties. Counsel cooperated in calling witnesses, and the blood test results were reviewed by four prominent expert witnesses.

Analysis and Interpretation of Blood Test Results by Experts

The issue is whether the illegitimate child is the son of the deceased. The test results in Tables 1 and 2 reveal a high cumulative paternity index of more than 500 : 1 and above 99%

Received for publication 1 July 1988; revised manuscript received 19 Aug. 1988; accepted for publication 22 Aug. 1988.

[1]Adjunct professor of forensic sciences and immunogenetics, University of Illinois at Chicago.

TABLE 1—*Blood test results (phenotypes).*[a]

Genetic Systems	GM-AA	GF-AA	AA-1	AA-2	WX-1	L-C	BB-1	I-C	XH-1	GM-BB	GF-BB
ABO	A	O	O	?	O	O	A	A	A	O	A
RH	DcEe	DCce	DCce	?	DcEe	DcE	DCce	DCcEe	DCcEe	DcEe	DCe
MNSs	Ns	MS	MNSs	?	Ns	Ns	MNs	MSs	Ns	Ms	MNs
Kell	K−k+	K−k+	K−k+	?	K−k+	K−k+	K−k+	K−k+	K−k+	K−k+	K−k+
Duffy	a+b−	a−b+	a+b+	?	a−b+	a−b+	a−b+	a−b+	a+b−	a−b+	a−b+
Kidd	a+b+	a+b−	a+b+	?	a+b+	a−b+	a+b+	a+b−	a−b+	a+b−	a−b+
AcP	AB	AB	AB	?	B	AB	AB	B	B	B	A
EsD	1	1	1	?	1	1	1	1	1	1	1
GLO	2−1	1	1	?	2	2−1	2	2−1	2−1	2	2
PGM1	1+	1+	1+	?	1+	1+	1+	1+	1−	1+	1+
Tf	C1	C1	C1	?	C1	C1	C1	C1	C1	C1	C1
Hp	2−1	2	2	?	2	2	2	2	2−1	2	2
Gc	2−1S	2−1S	2	?	1S	1S	1S	1S	1S	1S	1S
Gm	FB	AGFB	AGFB	?	AGFB	AGFB	AGFB	AGFB	AGFB	AGFB	AGFB
Km	1−	1−	1−	?	1−	1−	1−	1−	1−	1−	1−
HLA	A 25,31	1,32	1,25	?	2,31	1,2	26,28	28,31	2,3	2,26	1,28
	B 18,35	57,61	57,18	?	57,18	57,57	44,44	35,44	51,17	7,44	8,44

[a]GM-AA = mother of deceased man, GF-AA = father of deceased man, AA-1 = brother of deceased man, AA-2 = deceased man, WX-1 = ex-wife of deceased man, L-C = legitimate child, BB-1 = petitioner, I-C = illegitimate child, XH-1 = boyfriend of petitioner, GM-BB = mother of petitioner, and GF-BB = father of petitioner.

TABLE 2—*Paternity calculation.*[a]

Genetic Systems	Mother BB-1	Child I-C	AA-2 Obligatory Genes	Possible Genotypes AA-2	AF(AA-2)/ Random Man	Index (PI)
ABO	A	A	A,O	A,O	1/.93	1.075
Rh	DCce	DCcEe	DcE,dcE	DCe,DcE,Dce,dce	.25/.14	1.786
MNSs	MNs	MSs	MS	MS,MgS	.5/.24	2.083
Kell	K−k+	K−k+	k+	k+	1/.95	1.053
Duffy	a−b+	a−b+	Fyb	Fya,Fyb	.5/.61	0.820
Kidd	a+b+	a+b−	Jka	Jka,Jkb	.5/.53	0.934
AcP	AB	B	B	A,B	.5/.54	0.926
EsD	1	1	1	1	1/.90	1.111
GLO	2	2−1	1,2	1,2	.5/.42	1.190
PGM1	1+	1+	1+	1+	1/.65	1.538
Tf	C1	C1	C1	C1	1/.65	1.538
Hp	2	2	2	2	1/.54	1.825
Gc	1S	1S	1S	1S	1/.70	1.429
Gm	AGFB	AGFB	AG,FB	AG,FB	.5/.96	0.521
Km	1−	1−	1−	1−	1/.89	1.124
HLA	A 26,28	28,31	31	25/18;32/61	.25/.0031	80.645
	B 44,44	35,44	35	31/35;32/61		
				1/57;25/18		
				1/57;31/35		

[a]Cumulative Paternity Index is more than 500 : 1. Relative chance of paternity is above 99%. BB-1 = petitioner, I-C = illegitimate child, and AA-2 = deceased man.

plausibility of paternity. Three expert witnesses issued an opinion, based upon this result, that AA-2 is the biological father of I-C. However, another witness issued an opinion contradictory to the other expert witnesses. This opinion was based on the Mendelian law of inheritance, that is, the mother and a true father should provide half of his and her genetic products to the child. The laboratory performing the serological analysis used multiple genetic systems which are genetically well defined [*1–4*]. The results revealed to the contrary expert that it is genetically impossible for AA-2 to be the true father of I-C, unless a cross-over or a recombination event occurred during cell meiosis of Chromosome 6. The marker of importance is glyoxalase (GLO), which is closely linked to human lymphocyte antigen (HLA). Since a cross-over or recombination event is a rare event, usually less than 1%, this expert brought out the importance of using multiple test systems, especially in this case [*5*]. Red blood cell enzyme and serum protein testing, specifically the GLO system, provided the information that HLA A31-B35 in I-C did not come from the same HLA A31-B35 of the decedent's mother (GM-AA), as illustrated in Fig. 1, even though the HLA A31-B35 haplotype combination occurs in only about 28 in 10 000.

Conclusion

The outcome of the court decision was based on the burden of proof of petitioner (BB-1) to show with clear and convincing evidence, including the blood test results and testimony of the experts, that AA-2 was indeed the father of I-C. In this particular case the petitioner failed to do so. The decision, however, was almost in favor of the petitioner. For example, if only the HLA blood test results were used in this particular case, unquestionably every expert witness in the field would have to say the decedent has above a 98% chance of being the biological father of I-C. According to prominent experts in the field, HLA is the most powerful singie system and can exclude a falsely accused man above 85% of the time. However,

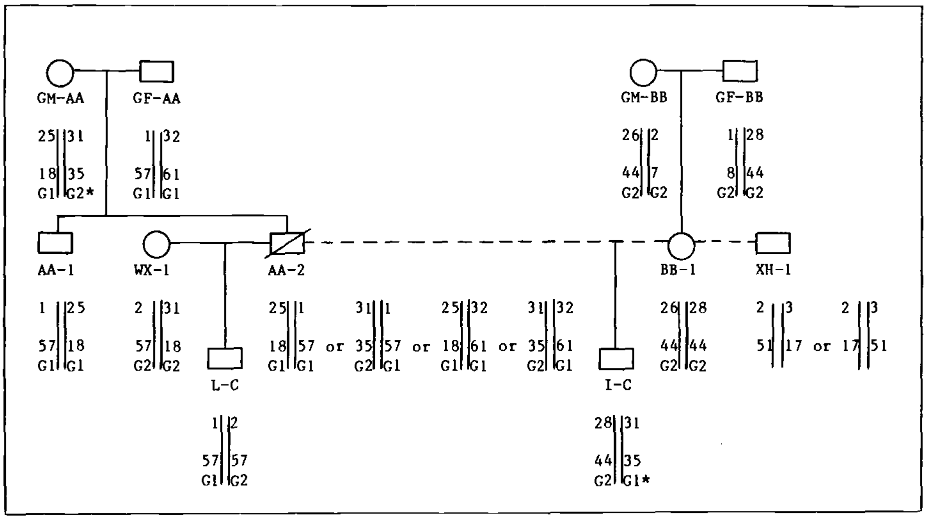

FIG. 1—*Inheritance pattern analysis of HLA haplotype associated GLO on the short arm of Chromosome 6.* G = *GLO marker. *HLA A31-B35 present between GM-AA and I-C carry different GLO markers.*

with state-of-the-art technology and the use of multiple systems blood-testing programs, probability of exclusion of above 99% are now possible and should be requested.

It is important to state that even though a probability of paternity above 99% appears in favor of the decedent being the biological father, it does not prove paternity; it is just high probability and it could also be misleading [*6, 7*]. As stated earlier by many experts in the field, it is not difficult for the test data to result in above 99% relative chance of paternity as occurred in this case. Using multiple genetic systems, the exclusionary power of the testing program is greater and better for both parties [*8*], that is, the more systems that are included in the testing program, the higher the cumulative chance of exclusion and often the higher the plausibility of paternity in the event of nonexclusion.

The application of multiple genetic systems and knowledge of gene systems linkage in this case, even though the cumulative chance of paternity is above 99% and numerous experts agreed the decedent was the true father, enabled the fourth expert witness to state that the marker (#1) of the GLO system inherited by I-C is different from the GLO marker of the grandmother (GM-AA). The author agrees with the concept of using the testimony of an expert, provided the expert has sufficient training and education, with expertise in the particular area of contention. In this particular case, the difference of opinion on the same evidence allowed justice to be served, thereby underscoring the importance of using multiple test systems, particularly the GLO and HLA systems because of their close linkage on Chromosome 6 and proper interpretation of these GLO-HLA haplotypes by the expert.

References

[*1*] Giannelli, P. C. and Imwinkelrid, E. J., *Scientific Evidences*, The Michie Company Law Publisher, Charlottesville, VA, 1986.

[*2*] "Joint AMA-ABA Guideline: Present Status of Serologic Testing in Problems of Disputed Parentage," *Family Law Quarterly*, Vol. 10, 1976, pp. 247-285.

[*3*] "Inclusion Probabilities in Parentage Testing," *The Airlie Conference Proceeding*, American Association of Blood Banks, 1983.

[*4*] Committee on Parentage Testing, *Standards for Parentage Testing Laboratories*, American Association of Blood Banks, May 1985, p. 1.260.

[5] Boonlayangoor, P. W., Telischi, M., and Paulsen, M. D., "Paternity Blood Testing: Analysis, Interpretation and Selection of a Program to Verify Parentage," *Illinois Bar Journal,* Vol. 75, No. 5, 1987, pp. 278-282.
[6] Silver, H. and Schoppmann, A., "Limitation of Paternity Testing Calculations," *Transfusion,* Vol. 27, No. 3, 1987, pp. 288-290.
[7] Borowsky, R., "HLA and the Probability of Paternity," *American Journal of Human Genetics,* Vol. 42, 1988, pp. 132-134.
[8] Salmon, C. and Cartron, J., *The Human Blood Groups,* Year Book Medical Publisher, 1984, p. 397.

Address requests for reprints or additional information to
Dr. Pravatchai W. Boonlayangoor
Cook County Hospital Paternity Laboratory
1835 W. Harrison St., 7th Floor Main Bldg.
Chicago, IL 60612