CASE REPORT

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Paternity Testing in a Kidnapping Case

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ABSTRACT: A case of kidnapping involving the concept of paternity testing is described. The couple arrested and charged with kidnapping stated the child in their possession was their biological daughter. Serological tests were performed on liquid blood samples in an effort to determine if the couple could have been the biological parents of the child. Two genetic inconsistencies were discovered in the 15 blood marker systems analyzed.

KEYWORDS: pathology and biology, paternity, genetics typing, electrophoresis, allele, isoelectric focusing

Forensic serologists routinely analyze bloodstains collected at a scene of a crime and compare those bloodstains to known samples collected from suspect(s) and victim(s). The comparison consists of analyzing genetically controlled traits that are inherited from an individual's biological parents. These traits become a permanent marker throughout the life of an individual.

An average person inherits 23 chromosomes from each parent. The chromosomes carry genes which determine the "characteristics" of an individual. In a liquid blood sample, several of the genetic characteristics can be determined by immunochemical and electrophoretic techniques.

Case Report

An unusual kidnapping case was received in the Serology section of this laboratory. A couple was arrested and charged with kidnapping a child. The couple had the child in their custody at the time of arrest. The defense of this case centered on the concept that the kidnapped child was the biological daughter of the couple arrested. Blood samples from both suspects, child, and reported biological mother were received for analysis. The reported biological father could not be located for collection of a blood sample. All individuals involved were white.

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TABLE 1—*Results.*

	ABO Type	Rh Type	MN Type	Lewis Type	ESD Type	PGM Type	PGM Sub-type	GLO Type	EAP Type	ADA Type	AK Type	GC Type	Hp Type	PGD Type	C-3 Type
Reported biological mother	A	cde	MN	a^+ b^-	1	1	1+	1	BA	1	1	1	2−1	A	S
Child	O	CcDe	M	a^+ b^-	1	2−1	2+1+	1	A	1	1	1	2	A	FS
Female suspect	O	CDe	M	a^+ b^-	1	1	1+1−	2−1	BA	1	1	1	2−1	A	S
Male suspect	O	cDe	M	a^+ b^-	1	2−1	2−1+	2−1	B	1	1	1	2−1	A	FS

Application

Fifteen genetic marker systems were typed for possible exclusion or inclusion. Laboratory results are listed in Table 1. Obviously, the girl's biological parents would have to possess the necessary genetic traits to qualify as the possible parents.

Discussion

Of the fifteen genetic marker systems examined, only two systems revealed any genetic incompatibilities. One genetic incompatibility was identified with respect to the erythrocyte acid phosphatase (EAP) enzyme. For the male suspect to be the biological father, he would have to donate one EAP gene to the child. Analysis of the blood samples revealed the male suspect to be EAP Type B and the female suspect to be EAP Type BA. The child would have to possess at least one EAP B allele for her to be the biological child of the alleged father. The child was determined to be an EAP Type A. Therefore, the male suspect could be eliminated as the biological father of the child. The female suspect could not be eliminated as the biological mother according to the EAP determinations.

Silent phosphatase genes (P^o) have been detected in Austrian, German, Danish, and Polish populations [*1-5*]. Quantitative studies of the rare silent phosphatase allele have revealed that although the isoenzyme banding pattern is normal, the phosphatase activity level is about half normal. In this case, quantitative assays were not performed, however, after electrophoretic staining all blood samples exhibited normal phosphatase activity compared to the known standards.

The second incompatibility was detected in the phosphoglucomutase (PGM) enzyme. Conventional electrophoresis did not reveal any incompatibilities between the suspects and child. However, PGM subtyping, with isoelectric focusing, disclosed the second incompatibility. The child was determined to be a PGM subtype 2+ 1+, while the male and female suspects were PGM subtypes 2− 1+ and 1+ 1−, respectively. The PGM subtype exclusion of the male suspect is based on the presumption that the female suspect is the mother. If one presumes the male to be the father, then the female suspect is excluded as the mother. In short, PGM subtyping excludes the couple but not either individual separately.

Conclusion

In presenting the serological evidence to a jury, testimony was given, stating the male suspect could not have fathered the child. However, serological considerations alone could not eliminate either female as the biological parent.

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