CHANCE OF EXCLUDING PATERNITY BY HLA IN MEN NOT EXCLUDED BY OTHER SYSTEMS. H. F. Polesky, Jane M. Souhrada, Dale D. Dykes, and Margaret Helgeson. Memorial Blood Center of Minneapolis, Minneapolis, Minnesota, 55404, U.S.A.

In our laboratory we routinely test all cases of disputed parentage with a battery of 14 to 16 genetic systems (red cell antigens, serum proteins and red cell enzymes) that in accordance with the AABB Standards for Parentage Testing should exclude 95% of falsely accused men.(1) In selected cases the test battery used is expanded to include several additional systems. The reasons for doing more testing include cases with a PI $\leq$ 10 after routine tests are completed, cases with a single indirect exclusion, cases where there is a missing or deceased parent or when two men are tested and neither is excluded. In some cases, despite what appears to be a conclusive result, the court will order more testing. On other occasions we have been asked to justify why more testing is not considered necessary.

In order to evaluate the possibility of predicting the chance of obtaining an exclusion by doing additional testing we have compared the number of men only excluded by HLA -A,B with those not excluded by HLA or any other system (2). For each case the paternity index (PI) was calculated for all systems except HLA. A matrix using various ranges of PI for cases not excluded or excluded by HLA was used. (Figure 1) From these data the predictive value of a negative test, HLA will not exclude given a PI value for all other tests, was determined.

The study group consisted of 413 Caucasian trios (see Table 1). Testing prior to HLA included multiple systems (14-20). Only cases with a CPE $\geq$ .95 were included. Thirty-four men in this group were excluded by HLA only. In twenty (59%) of these cases the PI was less than 10 based on all other tests. In two (6%) cases the initial PI was greater than 100. In one of these cases the brother of the man excluded by HLA was not excluded. In the other case, two of several accused unrelated men were not excluded. Both had PIs > 100. One was and one was not excluded by HLA.

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The results of our data (see Table 2,3) indicate that the prior PI is useful in predicting whether additional tests (HLA) might exclude the already tested man. This same approach should prove useful for other marker systems.

REFERENCES

1. Standards for Parentage Testing Laboratories, American Association of Blood Banks. Arlington, VA. 1985.

2. Galen RS, Gambino SR, Beyond Normality: The Predictive Value and Efficiency of Medical Diagnosis. New York John Wiley & Sons, 1975.

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TABLE 1.

PI Before HLA Test	No. Tested	HLA Excludes #	HLA Excludes %
> 10	194	20	10.3
10 - 25	53	7	13.2
25 - 50	47	4	8.5
50 - 100	27	1	3.7
< 100	92	2	2.2
	413	34	8.2

TABLE 2.

	PREDICTIVE VALUE (%)	
PI CUTOFF	HLA EXCL (+)	NO HLA EXCL (-)
10	8.3	93.3
25	9.8	95.9
50	9.5	97.5

TABLE 3.

PI CUTOFF	CHANCE OF EXCLUSION WITH ADDED HLA TESTING (%) (1-PV neg)
10	6.7
25	4.1
50	2.5

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FIGURE 1

TEST	DISEASE	
	HLA PREDICTS	
	NOT EXCL (-)	EXCL (+)
PI < X (+)	False positive	True positive
PI $\geq$ X (-)	True negative	False negative

$$PV+ = P(\text{Disease} \mid \text{Pos test})$$
$$= P(\text{HLA excludes} \mid PI < X)$$
$$= TP/(TP + FP)$$

$$PV- = P(\text{No disease} \mid \text{neg test})$$
$$= P(\text{HLA does not exclude} \mid PI \geq X)$$
$$= TN/(TN + FN)$$

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