1-1-1980

Paternity Testing with the Human Leukocyte Antigen System: A Medicolegal Breakthrough

Vera L. Sterlek

Lee M. Jacobson

Follow this and additional works at: http://digitalcommons.law.scu.edu/lawreview

Part of the Law Commons

Recommended Citation
Available at: http://digitalcommons.law.scu.edu/lawreview/vol20/iss2/9
PATERNITY TESTING WITH THE HUMAN LEUKOCYTE ANTIGEN SYSTEM: A MEDICOLEGAL BREAKTHROUGH

I'll prove this truth with my three drops of blood.

Shakespeare

Trolius and Cressida

Act I, Scene III

INTRODUCTION

The California Legislature adopted the Uniform Act on Blood Tests to Determine Paternity in 1953, omitting the last sentence of section 4 of the Act that provided:

If the experts conclude that the blood tests show the possibility of the alleged father's paternity, admission of this evidence is within the discretion of the court, depending


The authors wish to thank Dr. Paul K. Terasaki, Ph.D., Professor of Surgery, University of California at Los Angeles; Ms. Tamara A. Harrison, Staff Research Associate, Dept' of Surgery, University of California at Los Angeles; and Robert W. Peterson, J.D., Professor of Law, University of Santa Clara, for their important contributions to the preparation of this article.


Only two of these states, Illinois and Oklahoma, have statutes similar to California that do not allow for the admissibility of blood test results that fail to exclude the putative father from paternity.

ILL. REV. STAT. ch. 40, § 1404 (Supp. 1979) provides:

If the court finds, as disclosed by the evidence raised upon the tests, that the alleged father is not the father of the child, the question of paternity shall be resolved accordingly. If the experts disagree in their findings, such findings shall not be admissible, and the question of paternity shall be submitted upon all the evidence.

OKLA. STAT. ANN. tit. 10, § 504 (West Supp. 1979) provides:

If the court finds that the conclusions of all the experts, as disclosed by the evidence based upon the tests, are that the alleged father is not the father of the child, the question of paternity shall be resolved accordingly. Evidence showing the "possibility" of paternity shall be inadmissible and the question of paternity shall be resolved on the basis of other evidence taken before the court.
 Upon the infrequency of the blood type.²

In September 1978, a state court of appeal in *Dodd v. Henkel*³ interpreted this omission as a clear act of negative legislative intent. The court held inadmissible results of a blood test that failed to exclude the alleged father (hereinafter putative father) from possible paternity. Four months after the decision in *Dodd*, another appellate court in *Cramer v. Morrison*⁴ held this same evidence admissible, citing the California Evidence Code, section 351⁵ as controlling.

The sole distinguishing feature between *Dodd* and *Cramer* was the type of blood test on which the assertion of paternity rested. The procedure utilized in *Dodd* incorporated a series of tests known as extended factoring, which included the ABO, MN, and Rh-Hr blood tests.⁶ The test results that were admitted in *Cramer* were the product of a recent advance in blood grouping technology known as the Human Leukocyte Antigen system (hereinafter HL-A).

To avoid the result in *Dodd*, the *Cramer* court reasoned that HL-A was not a blood test for the purposes of Evidence Code section 895⁷ because it typed white cells rather than red cells. This reasoning is tenuous at best because the legislature did not specifically state that the blood tests covered by sec-

---

5. CAL. EVID. CODE § 351 (West 1966) provides: “Except as otherwise provided by statute, all relevant evidence is admissible.”
6. The ABO, MN, and Rh-Hr blood grouping systems are the traditional tests employed in cases of disputed paternity, albeit not the most informative tests, as the chance of exclusion from paternity varies with the number of genetic markers utilized by a particular system.

Each of these systems types the red cells of the blood. Under the ABO system, four major categories classify blood: A, B, AB, and O. The MN system groups blood into the M, N, and MN types. Rh, rh', rh", hr', and hr" are the classifications in the Rh-Hr system.

Since these systems type for only a limited number of factors, when used in combination they can only yield a 53.9 percent probability of excluding a mistakenly accused defendant.

7. CAL. EVID. CODE § 895 (West 1966) provides:

If the court finds that the conclusions of all the experts, as disclosed by the evidence based upon the tests are that the alleged father is not the father of the child, the question of paternity shall be resolved accordingly. If the experts disagree in their findings or conclusions, the question shall be submitted upon all the evidence.
tion 895 must type exclusively for red cells. Furthermore, the court's analysis avoided the difficult and more crucial question of whether section 895 should be modified given the medical advances provided by the HL-A test.  

Legislative response came in the form of a proposed amendment to section 895. Following a brief hearing in the Assembly Judiciary Committee in May 1979, the bill was taken off calendar. Interest in this area was renewed, however, when State Assemblyman Dave Stirling introduced A.B. 1981 in January 1980.

This comment will survey the relevant state and federal statutes that govern paternity proceedings and review the mechanics of the HL-A system. The main focus, however, will be on the admissibility and evidentiary weight of blood test results that fail to exclude a putative father (i.e., inclusionary blood test results). The comment concludes with a discussion of future applications of the HL-A system.

STATE INTERESTS AND PATERNITY PROCEEDINGS

The United States Department of Health, Education, and

8. Thus, we have an appellate ruling that the HL-A test result that establishes actual paternity is admissible in evidence despite the existence of a statute that provides for admissibility only in the event of an exclusion.

1 DISPUTED PATERNITY PROCEEDINGS § 8.18 (Schatkin ed. 1979) (hereinafter cited as Schatkin).


9. If the court finds that the conclusions of all the experts, as disclosed by the evidence based upon the tests, are that the alleged father is not the father of the child, the question of paternity shall be resolved accordingly. If the experts disagree in their findings or if the experts conclude that the tests show the possibility of the alleged father's paternity, the question may, subject to section 352, be submitted upon all the evidence, including the evidence of probability based upon the infrequency of the relevant blood types involved.


10. If the court finds that the conclusions of all the experts, as disclosed by the evidence based upon the tests, are that the alleged father is not the father of the child, the question of paternity shall be resolved accordingly. If the experts disagree in their findings or if the experts conclude that the tests show the possibility of the alleged father's paternity, the question may, subject to section 352, be submitted upon all the evidence, including the evidence of probability based upon the tests.

Welfare estimated the number of illegitimate live births in 1974 at 418,000, a significant increase over the 1965 figure of 291,200.\textsuperscript{11} This dramatic rise in so short a time did not go unnoticed by the country's lawmakers, and in 1975, Congress established guidelines to control the distribution of federal assistance funds. Each state was encouraged to develop a plan to administer assistance with the goal of making present welfare recipients independent of future aid programs.\textsuperscript{12}

Section 602(a)(26)(B) of Title 42 of the United States Code requires that state plans provide a program whereby the states will undertake to establish paternity and secure support for a child born out of wedlock.\textsuperscript{13} Even where an individual is not eligible for such federal aid to dependent children, child support collection or paternity determination services are available upon request for a reasonable fee.\textsuperscript{14}

California responded to the federal guidelines by enacting sections 11475.1,\textsuperscript{15} 11476,\textsuperscript{16} and 11350.1\textsuperscript{17} of the Welfare and

\textsuperscript{15} Section 11475.1 provides, in pertinent part:
  Each county shall maintain a single organizational unit located in the office of the district attorney which shall have responsibility for promptly and effectively enforcing the obligation of parents to support their children and determining paternity in the case of a child born out of wedlock. The district attorney shall take appropriate action, both civil and criminal, to enforce this obligation when the child is receiving public assistance and when requested to do so by the individual on whose behalf the enforcement efforts will be made when the child is not receiving public assistance. There shall be prominently displayed in every public area of every office of the units established by this section a notice, in clear and simple language prescribed by the Director of . . . Social Services, that child support enforcement services are provided to all individuals whether or not they are recipients of public social services.

  Nothing herein shall prohibit the district attorney from entering into cooperative arrangements with other county departments as necessary to carry out the responsibilities imposed by this section pursuant to plans of cooperation with such departments approved by the State Department of Social Services.

\textsuperscript{16} Section 11476 provides, in pertinent part:
  It shall be the duty of the county department to refer all cases where a parent is absent from the home, or where the parents are unmarried and parenthood has not been determined by a court of competent jurisdiction, to the district attorney immediately at the time the applica-
Institutions Code. In addition, section 11477\textsuperscript{18} of that code requires that applicants, as a condition of eligibility for aid,

\[
\text{[c]ooperate with the county welfare department and district attorney in establishing the paternity of a child born out of wedlock with respect to whom aid is claimed, and in obtaining any support payments due any person for whom aid is requested or obtained.}\textsuperscript{19}
\]

Failure to cooperate is grounds for withholding aid to the applicant. If aid to the adult is withheld, any aid for which the child is otherwise eligible will be provided in the form of protective payments.\textsuperscript{20}

A remarkable feature of paternity actions is the high conviction rate.\textsuperscript{21} One explanation is that many defendants sim-
ply admit paternity. Possible motives behind a defendant's admission include:

(1) a sincere belief that he is the father, (2) a sense of pride arising from the fact that he could be the father, (3) a total lack of financial responsibility and, therefore, a careless attitude toward the situation, (4) inability to afford defense of the action and costs of blood tests and other evidence, or (5) a state of ignorance which confuses intercourse with paternity.\(^2\)\(^2\)

Even if the defendant does not admit paternity, another factor that may explain the high conviction rate was explained by the California Supreme Court in Huntington v. Crowley.\(^2\)\(^3\) The court noted that

in the emotional atmosphere generated in the courtroom by the spectacle of the unwed mother and the unwanted baby, it will often not be enough for an unjustly accused man to simply deny paternity, especially when . . . he concededly has had sexual intercourse with the mother at an earlier date.\(^2\)\(^4\)

Further criticism of the system was leveled by Professor Harry D. Krause. He commented:

[C]urrent paternity prosecution practice in many metropolitan areas is abhorrent. Blackmail and perjury flourish, accusation is often tantamount to conviction, decades of support obligation are decided upon in minutes of court time and indigent defendants usually go without counsel or a clear understanding of what is involved.\(^2\)\(^5\)

Moreover, simple lack of income will not insulate a man from a paternity action. This is true for a variety of reasons. First, although the putative father may not have any funds at present, future employment may generate income that could be used to support his child. This is especially significant since child support obligations are not dischargeable in bankruptcy.\(^2\)\(^6\) Second, liquid assets are not the sole indicia of a

\(^{254}\) (1971).
\(^{23}\) 64 Cal. 2d 647, 414 P.2d 386, 51 Cal. Rptr. 254 (1966).
\(^{24}\) Id. at 651, 414 P.2d at 386, 51 Cal. Rptr. at 258.
\(^{25}\) Krause, supra note 21 at 255.
man's ability to support a family. Life insurance policies, sur-

vivor's benefits, health insurance plans, worker's compensa-
tion, and wrongful death claims are valuable assets that may
provide future financial security.²⁷

**BLOOD TESTS IN PATERNITY ACTIONS**

*Historical Perspective*

A brief history of the use of blood test evidence in Cali-

fornia paternity proceedings begins with the infamous deci-

sion, *Berry v. Chaplin*.²⁸ In that case, a blood test showing
that the putative father, actor Charles Chaplin, could not
have fathered the child was held inconclusive on the issue of

nonpaternity. The evidence was merely considered and

weighed with all other evidence in the case.²⁹ The majority of

the court felt bound to apply the law set forth in *Arias v.
Kalensnikoff*,³⁰ which stated that such evidence was not con-
clusive unless declared so by the legislature in the code.³¹ Just-
tice McComb, in a concurring opinion, also felt bound by

*Arias*, but it was his belief that the *Arias* case was incorrectly
decided because it ignored advances made by the medical pro-

fession.³² Speaking of the ABO and MN blood tests, he said
that “to reject the new and certain for the old and uncertain
does not tend to promote improvement in the administration

of justice.”³³

In response to the adverse publicity and notoriety given
the *Chaplin* case, the California Legislature adopted the Uni-

form Act on Blood Tests to Determine Paternity.³⁴ Section 4
of the Act provides:

> If the court finds that the conclusion of all the experts, as
disclosed by the evidence based upon the tests, are [sic] that the alleged father is not the father of the child, the

question of paternity shall be resolved accordingly.³⁵

---

²⁹. *Id.* at 664-65, 169 P.2d at 451.
³⁰. 10 Cal. 2d 428, 74 P.2d 1043 (1937).
³¹. *Id.* at 432, 74 P.2d at 1046.
³². 74 Cal. App. 2d at 668, 169 P.2d at 453 (McComb, J., concurring).
³³. *Id.*
³⁵. CAL. EVID. CODE § 895 (West 1966).
Blood tests are now dispositive of the issue of nonpaternity except where the Evidence Code's conclusive presumption of legitimacy comes into play. That is, where the husband and wife are cohabitating during the period when conception occurred, the husband is conclusively presumed to be the father unless he is impotent or sterile. This law has withstood constitutional challenge.

There is strong support, however, for the contention that the presumption of legitimacy should be rebuttable through a showing of blood test results that exclude the husband as being genetically capable of fathering the child in question.

36. CAL. EVID. CODE § 621 (West Supp. 1980). Public policy underlying the conclusive presumption is suggested as: 1) preserving family integrity, 2) avoiding the stigma of illegitimacy, and 3) reducing the financial burden of the state. Bois, California's Conclusive Presumption of Legitimacy—Its Legal Effect and Its Questionable Constitutionality, 35 S. Cal. L. Rev. 437, 465 (1962).


In a recent case, County of San Diego v. Brown, 80 Cal. App. 3d 297, 145 Cal. Rptr. 483 (1978), a white woman was married to a black man, who was not impotent during the period of conception. The woman gave birth to a white child. The husband denied paternity and attempted to offer proof of nonpaternity. He contended that: 1) the allegation that he fathered the child was contrary to the laws of nature, 2) the conclusive presumption, which denied him the opportunity to rebut paternity, deprived him of due process guaranteed under the California and United States Constitutions, and 3) application of the conclusive presumption of legitimacy denied him equal protection of laws. Id. at 301, 145 Cal. Rptr. at 484. The court held that there was no racial exception to the conclusive presumption of legitimacy, indicating that the rationale behind the presumption is to protect the integrity of the family while the husband and wife are living together. The court also rejected the defendant's constitutional claims, stating that the presumption of legitimacy bore a rational relationship to the state's goal of protecting family integrity. Id. at 308, 145 Cal. Rptr. at 489. See also In Re Marriage of Guardino, 95 Cal. App. 3d 77, 156 Cal. Rptr. 883 (1979); People v. Thompson, 89 Cal. App. 3d 193, 152 Cal. Rptr. 478 (1979).


But the courts have balked, and even here, blood test evidence has been rejected as counterproductive to the state goal of maintaining family integrity.  

Human Leukocyte Antigen System (HL-A)

HL-A was originally developed in 1964 by Dr. Paul I. Terasaki, Professor of Surgery at the University of California at Los Angeles, to minimize the possibility of organ transplant rejection.  

Subsequent research by scientists indicated a correlation between specific HL-A types and the presence of disease.  

HL-A was first used in paternity studies in the 1970's. As early as 1976, the Joint AMA-ABA Guidelines recognized that HL-A typing had already been used in Europe for paternity exclusion and had been successful in many cases where red cell typing (e.g., ABO) had failed to exclude paternity.  

Since that time, HL-A has been heralded as "the most potent system now available for paternity testing . . . ."  

The significant advantage of HL-A over other blood typing tests is that all HL-A types are relatively rare.  Thus, if a putative father shares a combination of HL-A types with a child, a high percentage of inclusion (the chance that he is the father) results.  Although extremely high exclusion rates are
possible products of multiple testing, costs and diminishing returns render excessive multiple testing impractical.47

Genetic concerns in blood grouping. At this point, it is important to note the three factors that enable scientists to draw conclusions from blood grouping about the identity of a child's parents: 1) the blood group of a person can be determined at birth, 2) the blood group remains constant throughout life, and 3) a child inherits his or her blood group from the parents in accordance with known genetic laws.48 These ge-


A sample of statistics showing exclusion rates for some selected tests along with combined rates have been calculated.

THE CHANCE OF AN ENGLISHMAN BEING EXONERATED, BY THE BLOOD GROUPS, OF A FALSE CHARGE OF PATERNITY BROUGHT BY AN ENGLISHWOMAN

<table>
<thead>
<tr>
<th>System</th>
<th>Exclusion by each system</th>
<th>Combined exclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ABO</td>
<td>0.1760</td>
<td>0.1760</td>
</tr>
<tr>
<td>2. MNSs</td>
<td>0.2390</td>
<td>0.3729</td>
</tr>
<tr>
<td>3. Rh</td>
<td>0.2620</td>
<td>0.5309</td>
</tr>
<tr>
<td>4. Kell</td>
<td>0.0879</td>
<td>0.5487</td>
</tr>
<tr>
<td>5. Lutheran</td>
<td>0.0333</td>
<td>0.5637</td>
</tr>
<tr>
<td>6. Duffy</td>
<td>0.0174</td>
<td>0.5844</td>
</tr>
<tr>
<td>7. Kidd</td>
<td>0.0486</td>
<td>0.5963</td>
</tr>
</tbody>
</table>


47. Krause, supra note 21, at 259; Joint Guidelines, supra note 43, at 254-55. For example, if initial tests exclude 90% of the putative fathers, a proposal to do another test offering a 10% exclusion rate will only raise the total exclusion rate from 90% to 91%. Thus, the accused derives only one-tenth of the potential value of this additional test, for the same cost. L. Sussman, Paternity Testing By Blood Grouping 128-29 (2d ed. 1976).

This chart lists the individual probability of excluding non-fathers of three racial populations for each of the seven systems recommended by the AMA-ABA Joint Guidelines.

MEAN PROBABILITY OF EXCLUSION OF NON-FATHERS

<table>
<thead>
<tr>
<th>System</th>
<th>Black</th>
<th>White</th>
<th>Japanese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. ABO</td>
<td>.1774</td>
<td>.1342</td>
<td>.1917</td>
</tr>
<tr>
<td>2. RH</td>
<td>.1859</td>
<td>.2746</td>
<td>.2050</td>
</tr>
<tr>
<td>3. MNSs</td>
<td>.3206</td>
<td>.3095</td>
<td>.2531</td>
</tr>
<tr>
<td>4. Kell</td>
<td>.0049</td>
<td>.0354</td>
<td>0</td>
</tr>
<tr>
<td>5. Duffy</td>
<td>.0420</td>
<td>.1844</td>
<td>.1159</td>
</tr>
<tr>
<td>6. Kidd</td>
<td>.1545</td>
<td>.1869</td>
<td>.1573</td>
</tr>
<tr>
<td>7. HLA</td>
<td>.78-.80</td>
<td>.78-.80</td>
<td>.78-.80</td>
</tr>
</tbody>
</table>

Joint Guidelines, supra note 43, at 257.

48. Lamb, supra note 39, at 165. The HL-A test was utilized to determine the father prior to birth in a case in Sweden where a white woman married to a black man had an affair with a white man. The couple required the information prior to
Paternity testing

1. A child cannot have a genetic marker [or expression] which is absent in both parents.
2. A child must inherit one of a pair of genetic [expressions] from each parent.
3. A child cannot have a pair of identical genetic [expressions] (aa) unless both parents have the [expression] (a).
4. A child must have the genetic [expression] (a or b) which is present as an identical pair in one parent (aa or bb).

Thus, if a child has a blood factor not found in the mother, that factor must have come from the father. If a putative father lacks a blood factor found in the child that could not have been obtained from the mother, the putative father cannot be the father of that child. This result is termed an exclusion.

Genetics and HL-A. The Human Leukocyte Antigen system is based upon the identification of antigens, substances that stimulate antibody production when introduced into another human body. Because the HL-A test detects antigens by using antisera (antibodies), it is known as a serologic test.

Genes control the production of antigens in the body. Since a person's genetic makeup (genotype) is inherited, one half from each parent, it is therefore possible to make certain probability of paternity calculations by identifying antigens present on the surface of the white blood cell.

It is important to understand certain terms with regard to HL-A testing. First, all living cells have a nucleus. The genes necessary for cellular reproduction are located on chromosomes that exist in duplicate in the nucleus of a given cell. The position of a gene on a chromosome is called a locus. Two of these loci, A and B, located at the HL-A region of the chromosome, are used to evaluate parentage.

birth in order to decide whether the woman should have an abortion.


50. The laws of inheritance may be altered if a mutation occurs. The mutation rate for humans, however, is extremely low, on the order of one in one million. This has led blood group specialists to doubt whether blood group genes do mutate. Dodd, The Scope of Blood Grouping in the Elucidation of Problems of Paternity, 9 Med. Sci. L. 59 (1969). Such evidence provides ample rebuttal for the frequent courtroom argument that a mutation has altered the laws of theoretical expectancy. Sussman, supra note 47, at 133.
Each antigen has two genetic expressions at a given locus; these two expressions are called alleles. One allele from the A locus is paired with one allele from the B locus. The pair occurs on the same chromosome in a combination known as a haplotype. Two haplotypes, one from each parent, comprise the child's genotype. With only the A and B loci considered, a total of four HL-A antigens occur on a white cell. Should less than four antigens occur on the white cell, the individual may be homozygous, a term that describes the presence of identical alleles at a particular locus; or he may express a blank, meaning that he possesses an antigen that, as yet, has not been detected. Undetectable antigens at the A and B loci are very rare.51

Final results of the HL-A paternity test are expressed in one of two ways. First, there may be an exclusion, where the putative father could not possibly have fathered the child in accordance with known genetic principles.52 The second possibility is inclusion, where the accused could either be the father or a random man who just happens to have the required genetic expression.53 Inclusionary test results are expressed in terms of a probability of paternity calculated by comparing the frequency with which the paternal haplotype occurs in the random population and the likelihood that the putative father's A and B loci antigens are paired such that he does have the true paternal haplotype.54 If a given putative father is not excluded, the unique feature of HL-A is that he can be assigned a high probability of paternity: this is almost impossible to obtain by conventional blood testing.55

One study that resolved one thousand cases of paternity not otherwise resolved by ABO testing, provided the following results:

52. See notes 48-49 and accompanying text supra.
54. Terasaki, supra note 51, at 546.
55. Id. at 552. "HLA is a super-system as compared with all the others . . . . There is no doubt that the percentage of exclusion by HLA will soon reach 99 percent, and 99.9 percent is not a wild guess." Schatkin, supra note 8, at § 8.08.
The results of this study are a clear indication that, if a putative father is not excluded by the HL-A test, the resulting inclusion rate (the probability of paternity) is very likely to be over ninety percent.\(^5\) Figures derived from further studies with an additional two thousand cases, show that eighty-seven percent of all inclusionary cases resulted in a probability of paternity equaling or exceeding ninety percent.\(^8\)

In light of continuing research in the area of serological testing, future percent probability of paternity figures can be expected to rise. This is due to the fact that as the number of known antigens increases, there will be a corresponding decrease in the likelihood that two people will possess identical haplotypes.

Assumptions underlying the HL-A paternity test. There are three key assumptions underlying the HL-A paternity test. First, the mother and putative father must have engaged in sexual intercourse at least once during the period of possible conception. This is self-evident. The second assumption is that a random man exists who has had access to the mother equal to that of the putative father. Third, the parties to be tested must be capable of being correctly identified as to their racial group.

The working hypothesis giving rise to the second assumption, that both one other non-excluded random man and the putative father had equal access to the mother, has been criticized because “a comparison of the putative father with a non-random man might better approximate the true situa-

---

56. Terasaki, supra note 51, at 552-53.
57. Id.
58. Interview with Tamara A. Harrison, Staff Research Associate, Dep't of Surgery, University of California at Los Angeles (December 18, 1978).
Futhermore, sexual relations do not generally occur on an equal access basis. In other words, the probability of a woman having sexual intercourse with man A, an accessible partner, is not necessarily equivalent to the probability of her having intercourse with man B, a second accessible partner.

The assumption of equal access implies that both the putative father and the non-excluded random man have a fifty-percent chance of fathering the child. This takes no account for other factors that influence the probability that sexual intercourse will result in pregnancy. Assuming that a woman would have had sexual relations with two men, both having the necessary haplotypes to have fathered the child, the results of the HL-A paternity test would evaluate both men as having the same percent probability of paternity. The test does not account for such crucial factors as: 1) the frequency of intercourse (e.g., the woman may have had intercourse with man A twelve times during the period of possible conception, while having intercourse only once with man B); 2) a significantly greater sperm count in man A compared with man B; 3) the woman’s natural fertility cycle (e.g., she may have had intercourse with man A during her highly fertile period as opposed to having intercourse with man B during a period of low fertility); and 4) the non-use of birth control devices or methods during intercourse with man A versus the use of highly reliable methods of contraception during intercourse with man B. The corroborative evidence presented in this hypothetical suggests that man A would have a much greater chance of fathering the child, yet this greater probability would not be reflected in the results of the HL-A tests.

Finally, haplotype frequencies vary among different racial groups. Thus, accurate probabilities of haplotype repetition can only be calculated if the parties are correctly typed with respect to race. In most instances this will not be a problem. In cases of mixed racial ancestry, however, ascertaining a person’s racial group may prove to be more difficult. This will be of special significance where one of the parents has been adopted and records of family history are not available.

The need for scientific evidence of inclusion. The backbone of any litigation is the evidence that is gathered and admitted to substantiate a claim. In particular, the overall quali-

ty of evidence in a paternity action seems inherently problematic. Seldom are there accurate and reliable eyewitnesses to intimate sexual activity, and self-serving testimony is always questionable. The problem of perjured testimony is particularly acute. Studies of paternity complainants, putative fathers, and witnesses indicate that approximately eighty-two percent may have committed perjury on the stand. A study of undisputed paternity cases indicated that nine percent of the men admitting paternity were not the true fathers of the children they accepted.

Clearly, there is a need for objective scientific evidence that does not depend upon recollection or veracity of witnesses. HL-A blood test results are exemplary since blood groups obey Mendelian laws of inheritance. There is a fear, however, that admission of scientific evidence will usurp the court's decision-making function—that a paternity action will become nothing more than a trial of the blood. This analysis, however, may obscure the real problem. Attention should focus upon court recognition of reliable scientific evidence, rather than the maintenance of some bastard notion of judicial authority.

The current test for the admission of scientific evidence was established in 1923 in Frye v. United States. Frye requires that scientific evidence be "sufficiently established to have gained general acceptance in the particular field in which it belongs." California, has adopted this standard, noting that its major advantage lies in the articulation of a conservative approach. Extensive periods of time generally intervene

---

62. Sussman & Schatkin, supra note 22, at 250.
64. Dodd, supra note 50 at 56.
67. 293 F. 1013 (D.C. Cir. 1923).
68. Id. at 1014.
between scientific discoveries and their acceptance as evidence in court proceedings.  

Although HL-A has been accepted by the California courts as scientific evidence of non-paternity, reservations do exist as to its validity for inclusionary purposes (i.e., establishing paternity). HL-A cannot definitely establish a non-excluded male as the father of a child, but it can generate a reliable figure that represents the probability of paternity. The question is whether a probability of paternity statistic should be legally cognizable by the courts.

The argument that an acceptable inclusionary blood test for paternity must reach absolute certainty confuses the scientific with the legal definition of fact. Presently, paternity cannot be proven to a degree of absolute certainty, but the standard of proof required in a paternity action is preponderance of the evidence. The degree of certainty generated by the HL-A paternity test (eighty-seven percent of all inclusionary tests result in a percent probability of paternity of ninety percent or greater) strongly indicates that HL-A paternity testing provides relevant evidence to be weighed by the fact finder along with all other evidence in the case.

72. The following table represents common probability of paternity figures and adjectives that describe their significance.

<table>
<thead>
<tr>
<th>Probability</th>
<th>Likelihood of Paternity</th>
</tr>
</thead>
<tbody>
<tr>
<td>99.80-99.90</td>
<td>Practically proved</td>
</tr>
<tr>
<td>99.1 -99.75</td>
<td>Extremely likely</td>
</tr>
<tr>
<td>95 -99</td>
<td>Very likely</td>
</tr>
<tr>
<td>90 -95</td>
<td>Likely</td>
</tr>
<tr>
<td>80 -90</td>
<td>Undecided</td>
</tr>
<tr>
<td>&lt; 80</td>
<td>Not useful</td>
</tr>
</tbody>
</table>

Adapted from Joint Guidelines, supra note 43, at 262.
73. "Before the scientist will speak of 'fact' he will insist on absolute certainty. The lawyer, however, customarily operates on a far lower level of certainty." Krause, supra note 47, at 260. But see Jaffe, Comment on the Judicial Use of HLA Paternity Results and Other Statistical Evidence: A Response to Terasaki, 17 J. Fam. L. 457, 483-84 (1978-79).
74. Harrison, supra note 58.
75. Admissibility of inclusionary HL-A blood test results should be allowed only upon a prior finding by the trier of fact that sexual intercourse did occur on at least one occasion between the parties during the period of conception. Second, to be admissible, the percent probability of paternity figure must be equal to or greater than 90 percent, a figure which Hummel (see note 72 supra) describes as indicating a "likely" likelihood of paternity.
Some HL-A critics will no doubt point to People v. Collins⁷⁶ for the proposition that mathematical probabilities have no place in the courtroom. In Collins, the California Supreme Court held it was reversible error for the trial court to admit testimony of a mathematician to the effect that there was a high probability that the two defendants perpetrated the alleged crime.⁷⁷ Two problems arose in connection with the evidence presented in Collins. First, the proffered probabilities were unsupported by scientific statistical data, and second, use of the probabilities distorted the issues put before the jury.⁷⁸ The court pointed out that the use of probabilities would foreclose an effective defense by an attorney unschooled in mathematics, thereby disadvantaging the quality of the defense.⁷⁹ Moreover, the court stated that applications of mathematical probabilities especially in criminal cases, “must be critically examined in view of the substantial unfairness to a defendant which may result from ill conceived techniques with which the trier of fact is not technically equipped to cope.”⁸⁰

Comparing the results of the HL-A paternity test with the evidence used in Collins, the first error—lack of appropriate scientific statistical data to formulate the probabilities—is not present.⁸¹ Genetic frequencies that are the basis of the HL-A test are the product of extensive scientific research and investigation of a wide variety of human populations. The second problem, jury confusion, is not so easily dismissed.

In Collins, the court found that “[t]he prosecution’s approach . . . could furnish the jury with absolutely no guidance on the crucial issue: Of the admittedly few couples, which one, if any, was guilty of committing this robbery?” ⁸² In terms of blood test evidence in a paternity action, the analogous question is: Of the admittedly few men carrying the proper haplotype, which one fathered the child? Thus, the fear expressed in allowing the use of inclusionary blood test

---

⁷⁶. 68 Cal. 2d 319, 438 P.2d 33, 66 Cal. Rptr. 497 (1968).
⁷⁷. Id.
⁷⁸. Id. at 327, 438 P.2d at 38, 66 Cal. Rptr. at 502.
⁷⁹. Id.
⁸⁰. Id. at 332, 438 P.2d at 41, 66 Cal. Rptr. at 505.
⁸². 68 Cal. 2d at 330, 438 P.2d at 40, 66 Cal. Rptr. at 504 (emphasis in the original).
evidence is that the paternity action will be reduced to a "trial by mathematics." 88

Other evidence in the case, however, could prevent any miscarriage of justice. Wigmore suggested that evidence of physical resemblance be admitted only after it has been shown that the putative father and the mother engaged in sexual intercourse. 84 Applying this suggestion to the instant problem, the results of blood tests that fail to exclude the putative father should be admissible only after it has been shown that the mother and putative father had sexual intercourse with one another during the period of possible conception. 85

Perhaps the greatest problem with admission of inclusionary blood test results is the reverence accorded scientific evidence by jurors. 86

Lay jurors tend to give considerable weight to "scientific" evidence when presented by "experts" with impressive credentials. We have acknowledged the existence of a . . . "misleading aura of certainty which often envelops a new scientific process, obscuring its currently experimental nature." 87

In defense of the jury's ability to weigh evidence adequately and fairly, the court in People v. Long 88 recognized:

A juror is not some kind of dithering nincompoop, brought in from never-never land and exposed to the harsh realities of life for the first time in the jury box . . . . Jurors are our peers, often as well educated, as well balanced, as stable, as experienced in the realities of life as the holders of law degrees . . . . The supposed influence on jurors . . . exists more in the imagination of judges and lawyers than in reality. 88

The scientific basis of the HL-A paternity test can ade-

83. Id. at 332, 438 P.2d at 41, 66 Cal. Rptr. at 505.
84. 1 J. Wigmore, Wigmore ON Evidence 623 (3d ed. 1940).
85. Comment, supra note 81, at 308.
89. Id. at 689, 113 Cal. Rptr. at 536.
quately be presented in a manner that lay jurors can understand. Since all evidence is intended to sway a jury, high percent probability of paternity calculations should influence jury decision making. Withholding this information therefore deprives the jury of relevant facts crucial to the outcome of the case.

Future uses of HL-A. The HL-A system is the subject of ongoing research in the scientific community. At present, the HL-A paternity test utilizes approximately fifty antigens located on either the A or B loci. Antigens are also being discovered on two additional loci. When all of the various HL-A antigens are discovered and classified, it has been estimated that at least 26,676 haplotypes will exist which could combine to form at least 355,817,826 genotypes.

While this comment has focused upon the use of blood test information with regard to the determination of paternity, there are a host of additional medical/legal problems

90. The adoption of a Model Jury Instruction, such as the one following, will serve as an important safeguard that will prevent putative fathers from suffering undue prejudice resulting from the admission of inclusionary blood test evidence:

PROPOSED MODEL JURY INSTRUCTION

The percent probability of paternity for Mr. _ is based upon the presence of genetic characteristics found in his blood through the use of the HL-A paternity test. HL-A measures the frequency of finding another man with the blood characteristics of Mr. _. The percent probability of paternity calculation is based upon two assumptions. The first assumption is that all men with Mr. _'s blood characteristics have an equal chance of being the father of Ms. _'s child without regard to the frequency of sexual intercourse with the mother, the fertility of both parties, and the use of contraceptive methods or devices. The second assumption is that Mr. _ and Ms. _ had sexual intercourse together on at least one occasion during the period of conception.

If you find that Mr. _ had sexual intercourse with Ms. _ on at least one occasion during the period of conception, you should weigh the percent probability of paternity calculation with all the other evidence in the case, including the credibility of the testifying witnesses.


The HLA tests will, in the course of time, become the most powerful tool for the determination of paternity or non-paternity. In fact, the probability of exclusion by HLA, will be greater than the cumulative probability of all other systems. Science has progressed to a point where ultimately in virtually every case where the accused is innocent, there will be an exclusion. And a man not excluded after complete testing will undoubtedly be the actual father of the child.

Schatkin, supra note 8, at § 8.04.
that admit to the use of blood grouping tests. Criminal cases involving murder, kidnapping, and rape often utilize blood specimens as a means of identifying possible suspects. Blood tests can also differentiate between identical and fraternal twins. The HL-A’s high degree of accuracy lends itself to application in these areas. Furthermore, noting the correlation between the presence of certain HL-A antigens and disease, insurance companies might request future policy holders to be blood typed in order to calculate the degree of risk upon which to base premium rates.

Increased use of the HL-A blood test must carry with it high standards of quality control to assure blood typing accuracy. Joint AMA-ABA Guidelines recommend several steps be taken to properly identify the parties being tested including recordation of driver’s license numbers, signatures, thumb prints, and photographs. Experts must limit themselves to conducting only those tests that they are qualified to perform. Independent verification of test results is also needed. “Only if such precautions are adhered to, will the full potential of modern tests for parentage and non parentage be realized without the danger of errors and miscarriages of justice.” The AMA-ABA Guidelines further recommend that standards of accreditation be proposed to aid in the identification of laboratories qualified to conduct paternity testing.

CONCLUSION

The Human Leukocyte Antigen system of blood testing, with its capability of generating high percent probability of paternity calculations, represents a significant scientific breakthrough. The California Legislature and judiciary should recognize the usefulness and wide acceptance of this recent scientific advancement and modify section 895 of the Evidence Code to admit inclusionary blood test results derived from HL-A paternity testing. Safeguards, such as those noted

93. Sussman, supra note 47, at 133.
94. Twardy, supra note 39, at 331-35.
95. HL-A use has also led to the discovery of one set of twins being sired by two different men. NEWSWEEK, Sept. 25, 1978, at 67.
96. Sci. Am., supra note 42; Schlosstein, supra note 42; Amos, supra note 42.
above, should be incorporated. At the same time, quality control guidelines must be set to ensure the greatest possible accuracy.

The legal profession has a responsibility to keep pace with qualitative advances in the scientific community. The use of the HL-A inclusionary blood test results in paternity actions will serve the ends of justice by replacing emotion with scientific fact.

_Vera L. Sterlek and Lee M. Jacobson_