

# DNA PATERNITY TESTS: Technology is Outpacing the Law

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Georgia law currently creates a rebuttable presumption of 97 percent probability of paternity based on genetic tests. This level of discrimination in DNA testing allows for a man presumed to be the father by law to have a genetic pattern identical to approximately one out of 35 individuals in the population.

But technology has now far outpaced the 97 percent probability standard. Today's DNA

technology allows for genetic testing to be accurate to levels significantly higher than 99 percent, prompting the consideration that the standard for probability of DNA testing in Georgia should be raised.

## Background on Paternity Law

Current Georgia law states that whenever there is an issue of paternity, the parties are entitled to a genetic test according to O.C.G.A. §19-7-43:

(e) In any case in which the paternity of a child or children has not been established, the

Department of Human Resources may order the mother, the alleged father, and the child or children to submit to genetic tests as specified in O.C.G.A. §19-7-45. The request for the order shall be supported by a sworn statement alleging paternity and setting forth facts establishing a reasonable possibility of the requisite sexual contact between the parties. The parties shall be given notice and an opportunity to contest the order before the department prior to the testing or the imposition of any noncooperation sanction.

Procedures for requesting a test are set forth in O.C.G.A. §19-7-45 and include the following requirements: The test must be conducted by a laboratory certified by the American Association of Blood Banks, and it must be performed by a duly qualified licensed

practicing physician or immunologist, or other qualified person. The court has the discretion to determine the number and qualifications of the experts.

The results of the test are to be made available to all parties at interest, and the court can issue an order for contempt for failure to submit to a genetic test or can dismiss the action if the petitioner refuses to take the test.

Testing procedures are important because the results are admissible at trial. Under O.C.G.A. §19-7-46, results are automatically admissible at the time of trial, including the statistical likelihood of the alleged parent's parentage, unless a party to the paternity genetic test objects in writing at least 30 days prior to the hearing at which the results of the testing may be introduced into evidence. Without a properly filed objection, the results will be entered without proof of authenticity or accuracy or the need for foundation. If there is an objection properly filed, the results will be admitted when offered by a duly qualified person.

The standard in Georgia for a proper foundation for the introduction of DNA evidence is a two-prong test: (1) evidence that the general scientific principles and techniques involved in DNA tests were valid and capable of producing reliable results, and (2) evidence that the tester who performed the scientific procedures did so in an acceptable manner. *Johnson v. State*, 265 Ga. 668, 461 S.E.2d 209 (1995).

DNA testing is not an exact science, and the court has held that the fact that genetic testing has a margin of error goes to the weight and credibility of the court assigned to the evidence. *Woodford v. State*, 240 Ga. App. 875, 525 S.E.2d 408 (1999). The court has yet to object to the lack of statistical evidence applying theories of population genetics to a finding of paternity. See FN 1 to *Johnson v. State*, supra and *Holden v. State*, 202 Ga. App. 558, 414 S.E.2d 910 (1992).

## Rebutting the Presumption

**A recent study highlights the necessity for reliable DNA testing. The study found that two out of 249 nonfathers had a probability of**

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**paternity of more than 99 percent. Only with additional DNA testing would these two men be correctly identified as nonfathers.** Given that a 97 percent rebuttable presumption for paternity exists in Georgia, it is important to understand how this presumption can be overcome.

First, there needs to be presentation of clear and convincing evidence as determined by the trier of fact. Thus, it is the trial judge's discretion to determine the clear and convincing evidence as to parentage since there is no right to a jury trial in paternity actions pursuant to O.C.G.A. §19-7-40.

The ability to present clear and convincing evidence can be aided by thoroughly understanding the significance of the DNA test report. The bottom-line results of a DNA paternity test are expressed by two primary numbers: the Combined Paternity Index (CPI) and the Probability of Paternity.

The CPI is a ratio that depicts the likelihood of the tested man being the biological father in comparison to the likelihood of a random, unrelated man in the population being the father.

Many people have difficulty understanding the likelihood ratios expressed in the CPI. Genetica DNA Laboratories, which performs DNA parentage testing nationwide at a guaranteed accuracy rate greater than 99.9 percent, has found that expressing the CPI as a frequency of occurrence is much easier to understand. For example, the DNA paternity test results can be stated: "one individual in 1,000 has this genetic pattern." This statistic is often calculated during the DNA testing process and is called the Random Man Not Excluded, or RMNE, statistic.

The Power of Exclusion, or PE statistic, on a DNA paternity test reports the accuracy of a given DNA test. For example, the PE statistic states: "999 out of 1,000 men in the population do not have this genetic pattern and therefore they are excluded from the possibility of being the father by the DNA test." Another way to express the PE statistic is: "This DNA test would exclude 99.9 percent of the male population from the possibility of being the biological father of the child."

In practice, however, the DNA test results are often expressed in terms of the probability of paternity. **Unfortunately, the probability of paternity statistic can be intuitively misleading. For example, a 99 percent probability of paternity sounds convincing. This high percentage value gives a sense of accuracy that the level of testing performed is more than adequate, and that false-positive test results are rare. However, the statistics in Table I highlight the misleading nature of the "probability of paternity" percentage.**

Table I

Probability of Paternity	Average Combined	Paternity Index/CPI
Average number of individuals with the same genetic pattern (random man not excluded)/RMNE		
95%	20	1 out of 20
97%	35	1 out of 35
98%	50	1 out of 50
99%	100	1 out of 100
99.9%	1,000	1 out of 1,000
99.99%	10,000	1 out of 10,000
99.999%	100,000	1 out of 100,000

Although it may be difficult to appreciate the significance

of the CPI number at first glance, notice that this statistic closely estimates the RMNE. For example, when the combined paternity index is 35, one out of approximately 35 individuals in the population has the same genetic pattern as the tested man. And, when the combined paternity index is 100, one out of approximately 100 individuals in the population has the same genetic pattern as the tested man. The 97 percent and 99 percent probabilities of paternity in Table 1 seem as if they are both close to an accuracy of 100 percent, but not when compared to their correlating one-in-35 and one-in-100 odds.

This analysis demonstrates the need for attorneys to consider stipulations. In the case of *Stephens v. State*, 224 Ga. App. 184, 480, S.E.2d 235 (1997), the defendant in a rape and molestation case entered into a stipulation that he would plead guilty if a second DNA test established a probability of paternity with at least a 90 percent. That means he would test positive as the father of one out of approximately every 10 children tested at random.

#### Studies of paternity cases

**Genetica DNA Laboratories has performed extensive DNA parentage testing throughout the last 10 years to reduce the number of false-positive test results. As a result, the company has amassed significant samples and data from proven nonpaternity cases to help test the validity of less-thorough genetic testing.**

**In one study, 249 nonpaternity cases were tested using a nine- or 15-genetic STR loci test.1**

**From the population of 249 nonfathers, one alleged father matched the child on all nine genetic sites and had a 99.66 percent probability of paternity (CPI of 298). A second man in this population had a probability of paternity of 99.72 percent (CPI of 353) after 15 genetic sites were tested.**

Other laboratories also have reported false-positive results when testing is stopped at a probability of paternity of less than 99.9 percent (CPI of 1,000). A case recently reported at the Twelfth International Symposium on Human Identification involved a man accused of rape whose DNA paternity test result showed a 99.3 percent probability of paternity. Only with additional testing was this man excluded as the biological father of the child resulting from the rape<sup>2</sup>. Also reported at the symposium was a case from the Arizona Public Safety Crime Laboratory that identified a match between two unrelated offenders, one Caucasian and the other African-American, who shared both alleles (genetic variants) at nine genetic loci<sup>3</sup>. In addition, the Florida State Crime Laboratory<sup>4</sup> has reported a nine-genetic loci match between two unrelated individuals.

#### Advances in Technology

As recently as 10 years ago, DNA parentage testing was performed using red blood cell (RBC), serum protein testing, and human leukocyte antigen (HLA) testing. Throughout the 1980s and the early 1990s, the state legislature required a probability of paternity of 95.0 percent to 99.0 percent because available tests were limited in their ability to exclude a falsely accused man from paternity.

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The advent of DNA technology in the late 1980s and the early 1990s has revolutionized parentage testing by dramatically increasing the ability to accurately exclude falsely accused men. In turn, when an accused man is not excluded following thorough paternity testing, his probability of paternity will typically be greater than 99.99999 percent, thereby removing any doubts of paternity.

In an ideal world, laboratories would provide extensive testing in all cases and would test to a level of certainty as high as 99.9999999 percent or more. Currently, the technology is available to provide that level of certainty in every case. Some private attorneys routinely specify that level of testing for their private clients. Paternity testing laboratories, however, have an economic incentive to keep the level of testing as low as possible.

Considering today's technology and current economic realities, what should be the minimum level of testing? Statistical calculations predict that when the testing is stopped at the combined paternity index of 100 (probability of paternity 99 percent), one out of approximately 100 individuals in the population have the same genetic pattern as the tested alleged father.

The Uniform Parentage Act (last revisions completed in 2000)<sup>5</sup> recommends that the threshold for the presumption of paternity be 99 percent probability. Using this guideline, both of the nonfathers in Genetica DNA Laboratories' study would have legally been presumed to be fathers. Only by increasing the threshold for the presumption of paternity to a minimum of 99.9 percent were these men correctly identified as nonfathers.

Technology is available for all laboratories to provide a CPI of 1,000 (probability of paternity 99.9 percent) at reasonable cost and turnaround time in virtually all standard parentage cases. Evidence also suggests that gains in adopting a minimum standard of a 1,000 CPI outweigh the costs, as reflected by several states increasing their standards for the presumption of paternity. Hawaii and Illinois increased the established presumption of paternity to a CPI of 500 (probability of paternity 99.8 percent). And, Louisiana has increased the established presumption of paternity with a DNA test to a minimum probability of 99.9 percent (CPI of 1,000).

#### Recommended legal standard for presumption of paternity

**Today's DNA technology and cost indicators make it clear that there is no reason to consider any standard below a CPI of 1,000 (probability of paternity 99.9 percent). As seen in the Genetica DNA Laboratories study, the number of nonfathers legally presumed to be biological fathers is significant when testing is stopped below a CPI of 1,000. A minimum CPI of 1,000 is also important because more extensive DNA testing provides a higher degree of confidence. This increased confidence often translates into fewer disputes. Additionally, an extensive DNA test is more reliable in excluding falsely accused men who are relatives of the biological father.**

**In addition, Genetica DNA Laboratories recommends that the legal standard should reference the CPI of 1,000 rather than the probability of paternity of 99.9 percent. The CPI reflects**

**more accurately the difference between higher and lower levels of testing. To the casual observer, the difference between 99 percent probability and 99.9 percent probability is not as obvious as the corresponding difference in the paternity index of 100 versus 1,000. This phenomenon is even more apparent when you consider that the two nonfathers in the Genetica DNA Laboratories study had probabilities of 99.66 percent and 99.72 percent and CPIs of 298 and 353 — significantly less than the recommended minimum CPI of 1,000.**

In addition to establishing a minimum CPI of 1,000, the law should provide that a genetic test cannot establish a presumption of paternity unless that same test also excludes at least 999 out of 1,000 non-fathers (excludes at least 99.9 percent of the population). This is the only way the law can ensure that tests establishing a presumption of paternity will exclude some minimum percentage of the population.

The minimum legal standard for the presumption of paternity by genetic testing must keep pace with advances in technology. The standard of 97 percent probability of paternity belongs in the past decade. In 2002, DNA technology and economic realities require a new standard. This new standard should read: "The legal threshold for the presumption of paternity through genetic testing requires a minimum combined paternity index of 1,000 and a minimum exclusion of 99.9 percent of men in the population."

**At a minimum, lawyers representing fathers in a paternity matter should demand the more-extensive paternity test.** Until the legal standards change, studies indicating false-positives when the probability of paternity is 99 percent, much less 97 percent, may be the key to "clear and convincing evidence" necessary to rebut the current presumption.

#### ENDNOTES:

1. Research study was conducted by Genetica DNA Laboratories, Inc., Cincinnati, Ohio. This study was supported in part by Applied Biosystems. The nine genetic sites tested included the following STR loci: D3S1358-3, VWA-12, FGA-4, D5S818-5, D13S317-13, D7S820-7, D8S1179-8, S21S11-21, and D18S51-18. The 15 genetic sites tested included the nine loci listed above and the following additional six STR loci: TH01-11, TPOX-2, CSF1PO-5, D16S39-16, D2S1338-2, D19S433-19. The study was presented in part at the Twelfth International Symposium on Human Identification. October 9-12, 2001.
2. Twelfth International Symposium on Human Identification. October 9-12, 2001. Bio Links, Lima, Peru.
3. Twelfth International Symposium on Human Identification. October 9-12, 2001. Arizona Department of Public Safety Crime Laboratory.
4. Florida State Crime Laboratory (personal communication).
5. Uniform Parentage Act (Last Revisions Completed Year 2000); National Conference of Commissioners on Uniform State Laws, January 5, 2001.

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