

Laboratory Procedures for Relationship Testing



Technical Bulletin 40-023

Setting the Standard for Quality DNA Identification

Laboratory analyses are performed in accordance with validated standard operating procedures. Samples are processed by one or more of the following techniques, depending on the nature of the evidence and the analysis requested.

DNA Extraction and Purification: DNA extraction is performed by one of the following techniques: EpiCentre QuickExtract, Helixtract, Promega DNA IQ System, or proteinase K/phenol-chloroform, depending on the nature of the sample.

DNA Analysis: Routine DNA amplification and fragment analysis is performed using the AmpFISTR Identifiler and/or Yfiler Kit and ABI PRISM® 3100 Genetic Analyzer manufactured by Applied Biosystems. Extended testing is performed using FFFL and PowerPlex 16 kits manufactured by Promega Corporation. A summary of the actual STR loci analyzed are presented with the laboratory results.

Statistical Analysis: Autosomal statistical calculations are performed using published allele frequencies such as found in JFS, 2003, Vol. 44 (6), JFS 2001, Vol. 46, FSC 2001 Vol. 3, Promega.com and Applied Biosystems. Y-STR profile frequencies were derived from www.appliedbiosystems.com/yfilerdatabase.

Analytical Platform

Paternity test results and conclusions are founded in statistics and probabilities. The greater the number of genetic markers examined, the greater the strength of the genetic evidence and hence the greater the reliability of the final result. Chromosomal Laboratories tests a minimum of 16 DNA markers in routine relationship testing. The 16 marker technology can achieve a probability of identity of 1 in 40 quintillion, or 1 in 40,000,000,000,000,000,000.

Extended Testing

For the majority of paternity cases, the 16 genetic marker panel is more than adequate. However, special circumstances can require extended testing to obtain a statistically desirable result. This typically occurs when there is a single genetic mutation or the mother is not included in the test. Extended testing options can include testing the mother, adding more autosomal genetic loci, or Y chromosome testing, if the child is a male. During case review our doctors may determine that extended testing is necessary or statistically useful, and will make recommendations for extended tests that are likely to be the most productive.

Motherless Testing

While motherless paternity testing is a relatively common practice, it can present a number of problems, ranging from inconclusive results, or in the case of incest or related alleged fathers, a false inclusion. DNA testing of the mother, even if maternity is not disputed, improves the chance of obtaining conclusive results and is a quality control check for both the scientific and legal community. In all relationship testing, every effort should be made to test the mother when she is available.



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Y-Chromosome Testing in Relationship Studies

The Y chromosome is male specific and passes through generations unchanged from father to son. In circumstances where an alleged father is unavailable for testing or is deceased, a male child can be tested against any number of his male relatives including, but not limited to, other known male children, brothers and half brothers with the same father, uncles, a grandfather, and grandfather's brothers. Since the Y chromosome is only found in males, this type of testing is not useful for female offspring. This test is also not appropriate for paternity in circumstances where there are two related alleged fathers.

Genetic Inconsistencies (Mutations)

Genetic inconsistencies (mutations) are naturally occurring mismatches between a child and the alleged parent. The frequencies of these naturally occurring mismatches are factored into the final combined paternity index. Due to the nature of these calculations, the statistical value of the result is significantly reduced; therefore some degree of extended testing is required to obtain a conclusive result.

Result Interpretation - Relationship Studies

The results of siblingship, avuncular and grand paternity testing are generally reported as the likelihood in support of or against an alleged relationship. While interpretation of the strength of the statistical value can be variable, and should ultimately be considered in context with all case circumstances, the table below summarizes published interpretative criteria for use as a guide.

Combined Likelihood Ratio	Value of Evidence in Support of Hypothesis
<1	Does not support hypothesis
1	Neutral
1 to 10	Limited Support
10 to 100	Moderate support
100 to 1,000	Strong Support
1,000 and greater	Very Strong Support

Quality Assurance

Chromosomal Laboratories, Inc is an American Association of Blood Banks (AABB) Accredited Relationship Testing Facility. AABB is an international association involved in activities related to transfusion and cellular therapies including transplantation medicine. Since its beginning in 1947, AABB continues to support the highest standards of medical, technical and administrative performance, scientific investigation, clinical application, standard setting, accreditation and education.

Chromosomal Laboratories, Inc is authorized to perform DNA Parentage/Identity Testing on samples originating in the State of New York by the New York State Department of Health, PFI: 8237.



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