

ITSI Biosciences Newsletter

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How DNA Test is Used to Determine Paternity

Paternity test, which is often sought for legal, medical, and personal reasons, involves analyzing the genetic material of the child and that of the alleged father to establish a biological relationship.

Here's a closer look at how DNA testing is used for determining paternity and why it is in high demand and widely considered the gold standard in parentage testing.

The Science behind DNA Paternity Testing

DNA, or deoxyribonucleic acid, is the hereditary material in humans and almost all other organisms. Each individual's DNA is unique, with the exception of identical twins. We inherit half (50%) of our DNA from our mother and half (50%) from our father. This genetic inheritance forms the basis for DNA paternity testing.

To determine paternity, DNA samples are collected from the child, the alleged father, and sometimes the mother. These samples are usually obtained through a simple, non-invasive cheek swab, which collects epithelial cells. In the laboratory, scientists extract the DNA from these cells and analyze specific regions known as genetic markers. These markers are highly variable among individuals, making them ideal for comparing genetic similarities between the child and the alleged father.

The turnaround time (from time DNA sample is collected to when result is issued) can vary from a few hours to a couple of weeks depending on the laboratory. There is a fully automated equipment known as "Rapid DNA" which can analyze DNA and produce results in about 90 min.

"In recent years, advancements in genetic science have made DNA testing a reliable and precise method for determining paternity..."

The testing Process

1. Sample Collection: The most common method for DNA sample collection is a buccal swab, which involves swabbing the inside of the cheek to gather cells. This method is painless and easy to administer. Alternatively, blood samples can also be used, though they are less common for paternity testing.

2. DNA Extraction and Amplification: In the laboratory, DNA is extracted from the collected cells. The extracted DNA is amplified using a process called polymerase chain reaction (PCR), which produces multiple copies of specific DNA segments for analysis. It is the PCR process that enables the analysis of small amounts of DNA.

3. Genetic Marker Analysis: Scientists analyze the amplified DNA for genetic markers known as short tandem repeats (STRs). The genetic markers are detected with equipment called a Genetic Analyzer. These markers are highly polymorphic, meaning they vary greatly among individuals. By comparing the STR patterns of the child with those of the alleged father, scientists can determine whether there is a match.



4. Statistical Analysis: The results are subjected to statistical analysis to calculate the probability of paternity.

A match between the child and the alleged father at all tested genetic markers typically results in a probability of paternity greater than 99.9%, which is considered conclusive scientific evidence of biological parentage.

Applications of Paternity Testing

Legal Purposes: DNA paternity testing is often used in legal cases involving child support, custody disputes, and inheritance claims. Courts rely on DNA test results to make informed decisions regarding parental responsibilities and rights.

Medical Reasons: Determining paternity can be crucial for medical histories and genetic counseling. Knowing the biological father can help identify potential genetic disorders and guide appropriate medical care and interventions for the child.

Personal and Social Reasons: Many individuals seek paternity testing for personal peace-of-mind. Confirming biological relationships can strengthen family bonds and resolve uncertainties.

Accuracy and Reliability

DNA paternity testing is highly accurate and reliable, with a probability of paternity often exceeding 99.9% when there is a match.

A match means that the alleged father “can not be excluded” as the biological father of the child.

When there is no match, the probability of paternity is 0.0%, and the alleged father is “excluded” as the biological father of the child.

The non-invasive nature of sample collection and the precision of modern genetic analysis techniques contribute to the widespread trust in these tests.

Conclusion

DNA testing has revolutionized the process of determining paternity, offering a scientific, accurate, and reliable method for establishing biological relationships.

Whether the test is for legal, medical, inheritance or personal reasons, DNA paternity testing provides definitive answers that can have profound implications for individuals and families.

As genetic science continues to advance, the accessibility and precision of paternity testing are likely to improve even further, making it an invaluable tool in modern society.

Organizations such as ITSI-Biosciences (www.itsibio.com), the Lagos State DNA & Forensic Center (www.lsdfo.org) and Concurrent Technologies and Services (www.ctsdna.com) offer DNA testing services to help answer different questions in life. Visit their websites to take advantage of their expertise.