

**IT IS IMPORTANT THAT CLIENTS UNDERSTAND THESE RISKS/LIMITATIONS BEFORE PROCEEDING WITH A TEST. THE TEST BOOKING FORM INCLUDES A LEGAL DECLARATION FROM THE CLIENT THAT THEY HAVE READ AND UNDERSTOOD THE LIMITATIONS ASSOCIATED WITH THEIR CHOSEN DNA TEST.**

## Paternal Test (including Mothers Sample)

### Related Alleged Fathers

If potential fathers are closely related e.g. brothers, a sample will be required from all potential fathers.

If this advice is not followed, it may only be possible to exclude a person as the biological father. An inclusion may be dependent on ruling out the second related party due to the fact that close relatives have more DNA in common than unrelated individuals.

### Mutations

Mutations occur randomly along the DNA molecule. It is extremely rare to see these mutations in the region of DNA analysed during a DNA test, however it is possible.

When a mutation does occur, it will cause a mismatch between the child and one of the biological parents.

If the mutation/mismatch occurs between the child and alleged fathers profile, the following will apply:

**One inconsistency** in a Paternal Test will be deemed as a mutation, when all of the other locations match the mother and father exactly.

**Two inconsistencies** may require analysis of further points on the DNA molecule to reach a conclusion. (This will incur an additional fee).

**Three inconsistencies** will not be mutation but simply a mismatch between the samples. The alleged father will be excluded as the biological father.

## Motherless Paternal Test (Mothers sample not available)

### Related Alleged Fathers

If potential fathers are closely related e.g. brothers, a sample will be required from all potential fathers.

If this advice is not followed, it may only be possible to exclude a person as the biological father. An inclusion may be dependent on ruling out the second related party due to the fact that close relatives have more DNA in common than unrelated individuals.

An inclusion may also only be possible if the mothers sample is included.

### Low Paternal Index

The frequency of alleles (numbers) differs within each given ethnic group and geographical population.

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(i.e. some are very common, some very rare). If the alleles (numbers) that match between a child and an alleged father (when the mother is not tested) are ALL very common to their origins, then this lowers the 'Paternity Index' and therefore the evidence of the result.

If this remains the case – even if a full match is found between the child's profile and the alleged fathers, it will be deemed INCONCLUSIVE.

If this occurs either the mothers sample must be included OR further points on the DNA molecule must be analysed. (This will incur an additional fee). A conclusive result can then be issued.

## **Mutations**

Mutations occur randomly along the DNA molecule. It is extremely rare to see these mutations in the region of DNA analysed during a DNA test, however it is possible.

When a mutation does occur, it will cause a mismatch between the child and one of the biological parents.

If the mutation/mismatch occurs between the child and alleged fathers profile, the following will apply:

**One inconsistency** in a Paternity Test with the mothers sample included would be deemed as a mutation, when all of the other locations match the mother and father exactly. However, in a Motherless Paternity Test, the test will be reported as INCONCLUSIVE. If this occurs the mothers sample must be tested. A conclusive result can then be issued. If this is not possible, then further points on the DNA molecule can be analysed. However, it may only be possible to exclude the alleged father by discovering further inconsistencies i.e. the inconsistencies will be deemed not to be mutation but simply a mismatch between the samples. The alleged father will be excluded as the biological father. (This will incur an additional fee).

**Two inconsistencies** the above will apply. (This will incur an additional fee) .

**Three inconsistencies** will not be mutation but simply a mismatch between the samples. The alleged father will be excluded as the biological father.

## **Maternity Test (Fathers sample is usually not available)**

### **Related Alleged Mothers**

If potential mothers are closely related e.g. sisters, a sample will be required from all potential mothers.

If this advice is not followed, it may only be possible to exclude a person as the biological mother. An inclusion may be dependent on ruling out the second related party due to the fact that close relatives have more DNA in common than unrelated individuals.

### **Low Maternity Index**

The frequency of alleles (numbers) differs within each given ethnic group and geographical population. (i.e. some are very common, some very rare.) If the alleles (numbers) that match between a child and an alleged mother are ALL very common to their origins, then this lowers the 'Maternity Index' and therefore the

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evidence of the result.

If this remains the case – even if a full match is found between the child's profile and the alleged mothers, it will be deemed **INCONCLUSIVE**.

If this occurs either the fathers sample must be included OR further points on the DNA molecule must be analysed. (This will incur an additional fee). A conclusive result can then be issued.

## **Mutations**

Mutations occur randomly along the DNA molecule. It is extremely rare to see these mutations in the region of DNA analysed during a DNA test, however it is possible.

When a mutation does occur, it will cause a mismatch between the child and one of the biological parents.

If the mutation/mismatch occurs between the child and alleged mothers profile the following will apply:

**One inconsistency** in a Maternity Test (when the fathers sample is not available) will produce an **INCONCLUSIVE** result. If this occurs the fathers sample must be tested. A conclusive result can then be issued. If this is not possible, then further points on the DNA molecule can be analysed. However, it may only be possible to exclude the alleged mother by discovering further inconsistencies i.e. the inconsistencies will be deemed not to be mutation but simply a mismatch between the samples. The alleged mother will be excluded as the biological mother. This will incur an additional fee.

**Two inconsistencies** the above will apply. This will incur an additional fee.

**Three inconsistencies** will not be mutation but simply a mismatch between the samples. The alleged mother will be excluded as the biological mother.

## **Y Chromosome Analysis**

### **Mutations**

Mutations occur randomly along the DNA molecule. It is extremely rare to see these mutations in the region of DNA analysed during a DNA test, however it is possible.

When a mutation does occur, it will cause a mismatch between the test participants.  
more DNA in common than unrelated individuals.

**One inconsistency** in a Y Chromosome Analysis Test will be deemed as a mutation, when all of the other locations match exactly.

**Two inconsistencies** will be classed as an **INCONCLUSIVE** result. This is extremely rare.

**Three or more inconsistencies** will be deemed a negative result i.e. the males do not come from the same paternal line.

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## **Existence of other potential paternal relationships**

### **Examples of when the test should be used...**

When all participants in a test are Male, this test may provide more information than the Sibling or Grand -parentage analysis.

#### **Case 1:**

Two men who believe they may share the same father, when the potential father is not available for testing.

#### **Case 2:**

Grand - parent analysis, where a male child wants to establish who his biological father is, by testing his PATERNAL grandparents (i.e. the parents of his biological father) This test would then compare the child's Y chromosome with the Y chromosome of his potential grandfather.

#### **Case 3:**

A female wants to prove a biological relationship to a living male. e.g. she believes the male to be her uncle's (father's brother) son. Females cannot be a DNA source in these tests because they do not possess a Y-chromosome. However, if the female has a brother or other closely related male (from the paternal line), the potential cousins Y Chromosome can be analysed against theirs. In this way, the female can still benefit from a Y-chromosome study.

#### **Case 4:**

Y chromosome analysis can also be used to assist families that emigrated from one country to another during the past 300 years. Over the years the trail of paper proofs becomes more difficult to find or they no longer exist. This test can prove a biological link between families.

## **What does the test NOT show?**

The test result will not give a conclusion on the nature of a paternal relationship if the Y chromosomes match OR give a reason for a mismatch. It can only tell the clients if their Y Chromosomes match and thus whether a paternal lineage exists between the two individuals.

Clients should be made fully aware of the limitations of the test before proceeding.

For Example:

- **Case 1** - A negative result means they do not have the same father. However, the result will not say who the biological father of each test participant is.

A positive result will demonstrate that the two men have a common paternal line, but it will not conclude that this is their biological father. This is because the potential father's brother, father, uncle etc, all share the same Y Chromosome. It is not within the parameter of the test to rule individuals out.

Therefore, in both scenarios, it will be for the Client to decide what the result means to them taking into account the facts and circumstances surrounding the test.

- **Case 2** - A positive result will demonstrate that the two men have a common paternal line, but it will not conclude that they are grandfather and grandchild.

A negative result means the paternal line does not exist – however, the test cannot show where the paternal line was broken i.e. it cannot prove that the alleged father was actually fathered by the

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grandfather being tested.

Therefore, in both scenarios, it will again be for the client to decide what the result means to them taking into account the facts and circumstances surrounding the test.

### **When should the test not be used?**

- If women are involved in the test e.g. a sibling test for a potential brother and sister. Women do not possess Y chromosomes!
- When other paternal links would make the result unclear. E.g. If a test participant was trying to establish who his biological father was by testing a potential paternal grandfather, but the man being tested could either be a grandfather or second uncle to the child in question. This would occur if the potential fathers in a case were paternal cousins!  
(i.e Second Uncle = Brother of the potential grandfather. Second potential father is son of second uncle, so cousin of first potential father. ALL these individuals would have identical Y - Chromosomes)

In scenarios such as this – a Y Chromosome analysis will not provide the client with any information.

## **Sibling Analysis**

Sibling analysis is not as conclusive as paternity testing. The results are based on statistical calculations that produce a probability of whether two individuals are true biological relatives.

The statistical analysis is based on factors such as:

- the number of allelic matches within the DNA profiles.
- how likely it is that the same allele would be found at that same DNA location, if testing a random, unrelated individual from the same ethnic background.

These calculations determine the most likely relationship between the individuals tested.

### **How the results are interpreted**

The values from the calculations are used to generate a percentage probability value. Based on the question the client wants us to answer, this value tells us which scenario is more likely.

For example, if two individuals want to know if they are half or full siblings, the percentage probability will indicate which relationship is most likely to exist. This percentage value will fall into one of three categories:

**0 – 10%:** This is evidence that the relationship does NOT exist i.e. for the example above, this would mean that the clients are unlikely to be full sibling, thus it is evidence that they are half siblings.

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**90 – 100%:** This is evidence that the relationship DOES exist i.e. for the example above, this would mean that the clients are likely to be full sibling.

**10 – 90%:** Tests falling within this range are deemed to be INCONCLUSIVE. This is because as an accredited laboratory, it is important that results are only given to the client when we can be confident that there is REAL and STRONG evidence that a certain relationship exists.

Please see the 'Visual Representation of Relationship Analysis' for a graphical version of the details above.

### **Sibling DNA Analysis is less accurate than Paternity/Maternity Testing.**

In a Paternity/Maternity test, exactly half of the child's DNA will match the biological father and the other half will exactly match the biological mother.

The DNA of siblings (except identical twins) will not match each other, as the inheritance of alleles (numbers) from biological parents is random. At each genetic location (part of the DNA) a person possesses two alleles (numbers). A person will only pass one of these alleles to their offspring. Which allele is passed on is completely random. Therefore, one child could inherit one allele from his father, while the child's brother or sister could inherit the other.

### **Inconclusive Results.**

While these tests can provide accurate results, there is the chance that the test will yield an INCONCLUSIVE result - see 'Visual Representation of Relationship Analysis'.

An INCONCLUSIVE result occurs in approximately 20% of sibling tests (i.e. 1 in 5). Causes of inconclusive results include:

- the alleles shared between potential siblings are extremely common within the relevant general population. In these circumstances there is insufficient genetic evidence unique to the individuals being tested to confirm which biological relationship exists.
- low level of allelic (number) matches in the DNA profile due to the chance nature of inheriting alleles within families (as explained above).
- mutation causing mismatches at further locations within the DNA profile.

If an INCONCLUSIVE result is given, clients may be provided with the option of analysing further points on the DNA molecule. (This will incur an additional fee).

### **When should Sibling studies be used?**

Usually, a Sibling test is only carried out as a last resort because the alleged mother and/or father are either deceased or unavailable for testing and other forms of test have been ruled out.

Due to the lengthy analysis, the cost of the test is higher than other forms of testing. This and the above risks mean other forms of test should be used first whenever possible.

### **Existence of other potential biological relationships**

If other potential biological relationships exist between test participant, it is unlikely that this test will yield

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evidence strong enough to distinguish between them.

For example: if test participants believe they are either half sibling OR cousins, this test should not be performed.

### **What does the test NOT show?**

The test result will not provide a conclusion on the identity of each test participants biological parents. It will be for the client to decide what the result means to them taking into account the facts and circumstances surrounding the test.

## **Grandparent Analysis**

Grandparent analysis is not as conclusive as paternity testing. The results are based on statistical calculations that produce a probability of whether two individuals are true biological relatives, but grandparent analysis cannot provide a conclusive result.

The statistical analysis is based on factors such as:

- the number of allelic matches within the DNA profiles.
- how likely it is that the same allele would be found at that same DNA location, if testing a random, unrelated individual from the same ethnic background.

These calculations determine the most likely relationship between the individuals tested.

### **How the results are interpreted**

The values from the calculations are used to generate a percentage probability value. Based on the question the client wants us to answer, this value tells us which scenario is more likely.

For example, in a grandparent analysis, the percentage value tells us the probability of whether that relationship is likely to exist. This percentage value will fall into one of three categories:

**0 – 10%:** This is evidence that the relationship does NOT exist i.e. this would mean that the clients are unlikely to be biologically related in terms of grandparent/grandchild.

**90 – 100%:** This is evidence that the relationship DOES exist i.e. for the example above, this would mean that the clients are likely to be biological related in terms of grandparent/grandchild.

**10 – 90%:** Tests falling within this range are deemed to be INCONCLUSIVE. This is because as an accredited laboratory, it is important that results are only given to the client when we can be confident that there is REAL and STRONG evidence that a certain relationship exists.

Please see the 'Visual Representation of Relationship Analysis' for a graphical version of the details above.

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### **Grandparent DNA Analysis is less accurate than Paternity/Maternity Testing.**

In a Paternity/Maternity test, exactly half of the child's DNA will match the biological father and the other half will exactly match the biological mother.

The DNA of grandparent and grandchildren will not match each other exactly.

### **Inconclusive Results.**

While these tests can provide accurate results, there is the chance that the test will yield an INCONCLUSIVE result - see 'Visual Representation of Relationship Analysis'.

An INCONCLUSIVE result occurs in approximately 20% of Grandparent tests (i.e. 1 in 5).

Causes of inconclusive results include:

- the alleles shared between test participants are extremely common within the relevant general population. In these circumstances there is insufficient genetic evidence unique to the individuals being tested to confirm which biological relationship exists.
- low level of allelic (number) matches in the DNA profile due to the chance nature of inheriting alleles within families.
- mutation causing mismatches at further locations within the DNA profile.

If an INCONCLUSIVE result is given, clients may be provided with the option of analysing further points on the DNA molecule. (This will incur an additional fee).

### **When should Grandparent studies be used?**

Usually, a Grandparent test is only carried out as a last resort because the alleged mother and/or father are either deceased or unavailable for testing and other forms of test have been ruled out.

Due to the lengthy analysis, the cost of the test is higher than other forms of testing. This and the above risks mean other forms of test should be used first whenever possible.

### **Existence of other potential biological relationships**

If other potential biological relationships exist between test participants, it is unlikely that this test will yield evidence strong enough to distinguish between them.

### **What does the test NOT show?**

The test result will not provide a conclusion on the identity of the test participants biological parents.

It will be for the Client to decide what the result means to them taking into account the facts and circumstances surrounding the test.