

Cellmark

DNA IMMIGRATION TESTING



Understanding your report

Phrases your Report may contain

Most likely relationship

This is the conclusion reached following a statistical comparison of the possible relationships considered in this case. Although the statistically most likely relationship has been given, it does not rule out the possibility that a different relationship exists.

Close family relationship

This phrase is used when the results of the tests are unable to define the precise nature of the relationship but there is evidence that the individuals are biologically related.

Conversely, if the individuals originate from a small community it is possible that a relationship such as half siblings appears as full siblings by DNA analysis.

Most likely unrelated

The statistical analysis of the DNA test results does not indicate the presence of a genetic relationship.

Introduction

DNA testing works by detecting certain parts or “markers” in the DNA molecule that are known to vary greatly between unrelated people. Our tests compare the DNA at a number of these markers to determine if people are related.

The process is called Short Tandem Repeat (STR) profiling. STR profiling is a very sensitive DNA testing procedure. DNA is extracted from the sample and a special enzyme is used to copy the genetic code at the relevant regions in the DNA. An STR profile is the result of several separate DNA tests.

Immigration Testing

Parentage testing

In each STR DNA test performed up to two DNA markers are observed in an individual’s DNA profile. One marker will have been inherited from the mother and the other marker will have been inherited from the father. By comparing the child’s DNA profile to the mother’s DNA profile we are able to determine the maternally inherited markers in the child’s DNA profile.

The remaining marker in the child’s DNA profile must have been inherited from their father. If the tested man were the biological father of the child then he would be expected to match all or all but one of the paternal markers in each STR

DNA test performed.

For maternity analysis; by comparing the child’s DNA profile to the father’s DNA profile we are able to determine the paternally inherited markers in the child’s DNA profile. The remaining marker in the child’s DNA profile must have been inherited from their mother. If the tested woman were the biological mother of the child then she would be expected to match all or all but one of the maternal markers in each STR DNA test performed.

A statistical analysis is then performed to determine the likelihood of the tested parents being related as mother and father of the child and the likelihood of them being related as the mother and father versus being related as the aunt and uncle.

Occasionally a rare genetic change can be observed resulting in one and very rarely two tests where there is no matching marker between the parent and child. This one non-matching test may be due to a mutation. A mutation is a natural change which occurs in the DNA of an egg or sperm resulting in a new marker in the child’s DNA profile which is not present in either of the parents’.

DNA profiles. The presence of this rare genetic change lowers the statistical likelihood ratio obtained. Sometimes the statistics cannot determine whether the most likely relationship is parent and child or aunt/uncle and nephew / niece. In these circumstances the DNA report will state that a close family relationship exists.

Single Parent testing

When only one parent is available for testing certain assumptions must be made which reduce the statistical certainty of the conclusion. Without a sample from the other parent it is assumed that a matching marker between the tested parent and child has been inherited from the tested parent.

There is a very small chance that addition of the other parent will alter the original DNA result obtained if the result is consistent with a parent and child relationship. If the DNA result excludes the tested parent then addition of the other parent will not change this DNA result.

Sibling testing

DNA relationship testing, where alleged siblings are tested, is not as conclusive as parentage testing. This is due to the nature of the inheritance of DNA markers. On average full siblings will share more DNA markers than half siblings, who in turn will share more DNA markers than unrelated individuals. However, due to the nature of inheritance this analysis can only give an indication of the relationship - it is not conclusive.

- Individuals are full siblings when they have the same genetic (biological) mother and father
- Half siblings share only one biological parent, either the mother or the father.
- Inconclusive between Full and Half Siblings is reported when the comparison of the DNA profiles provides a strong indication of a sibling relationship but, due to the patterns of DNA inheritance it is not possible to determine the true nature of the relationship tested.
- If the DNA report indicates that it is most likely the individuals are unrelated this does not exclude the possibility that a half sibling relationship exists but the individuals have not inherited enough of the same DNA markers in order to be able to detect this relationship.

If the individuals originate from a small community then a relationship of cousins may appear as half siblings. It is not possible to state in this situation whether the true nature of the relationship is cousins or half siblings.

Grandparentage testing

When the father is not available for testing and we have tested the mother, child and both paternal grandparents the child's paternal markers can be identified and compared with the DNA profiles of the grandmother and grandfather.

When only one grandparent is tested and a relationship is detected then the statistical result obtained in such cases is significantly lower than that obtained in parentage testing.

- When all the child's paternal markers match then a statistical analysis is performed and a combined grandparentage index is quoted in the report. The report will state that the DNA result is consistent with the grandmother and grandfather being related as the biological grandparents of the child. This means that the DNA results are consistent with a son of the grandparents being related as the child's father.
- If no relationship can be detected then the DNA report will state that no relationship can be demonstrated. However, because it is possible that a child can inherit paternal markers that were in turn inherited from the other grandparent, this does not exclude the possibility that the true nature of the relationship between the tested individuals is grandparent and grandchild.
- If the mother is not included in grandparent analysis then it is more likely that no relationship can be detected even if a biological relationship does exist.

Aunt/Uncle testing

This test relies on the child's parent and the aunt or uncle sharing enough DNA markers as siblings and then these same matching markers being inherited by the child. This type of analysis can only provide an indication of the relationship and is not conclusive. In some cases it may not be possible to detect a relationship even though one may exist. The DNA statistical results quoted in the report will be significantly lower than those obtained from parentage testing.

Cousin testing

Routinely it is not possible to detect a relationship of first cousins by standard DNA testing. If the individuals originate from a small community then a relationship of cousins may appear as half siblings. It is not possible to state in this situation whether the true nature of the relationship is cousins or half siblings.

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