

# An information sheet about the MTHFR test

(MTHFR = Methylenetetrahydrofolate Reductase)

## What is MTHFR?

MTHFR stands for methylenetetrahydrofolate reductase, which is the name of an enzyme. The MTHFR enzyme helps our bodies to process two chemicals called folate and homocysteine. Like all other enzymes, the MTHFR enzyme is made by a gene, in this case the MTHFR gene. We all have two copies of the MTHFR gene; one inherited from our mother and one inherited from our father.

## Everyone's genes are different

Although we all usually have the same number of genes, and the same types of genes, each person's genes are slightly different. So, the MTHFR gene in one person may be slightly different to the MTHFR gene in another person. There are two basic types of gene changes: mutations and polymorphisms.

## Gene Mutations

Gene mutations are changes that severely disrupt the way a gene works. For example, an MTHFR gene that has a mutation in it, either makes no MTHFR enzyme at all, or makes a faulty version of the MTHFR enzyme that does not work. Gene mutations can have very serious health consequences. Mutations in the MTHFR gene which cause severe MTHFR deficiency are extremely rare (<200 reported cases worldwide). Babies born with two severe MTHFR mutations suffer from major birth abnormalities and have a very poor outlook.

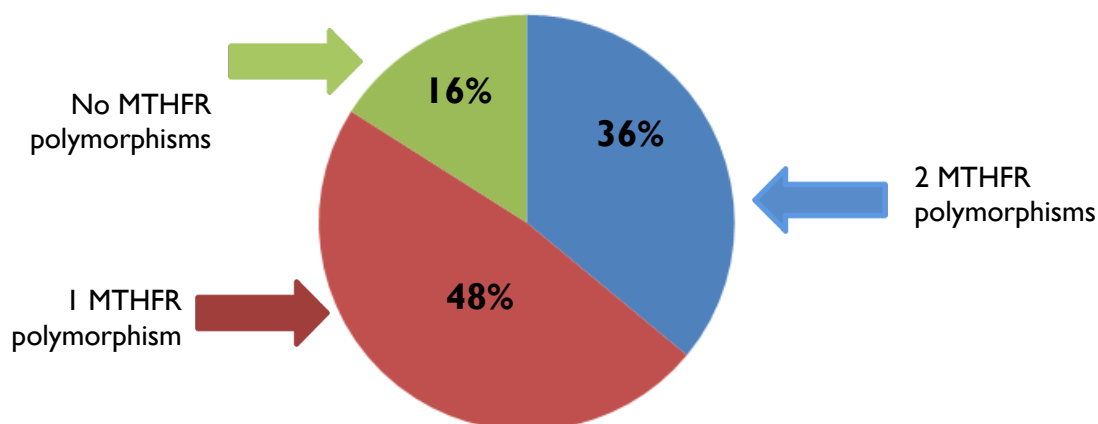
## Gene polymorphisms

Poly means many; morphisms means forms. Polymorphism is the word used for common gene changes that are considered harmless to our health. There are two polymorphisms that are commonly found in the MTHFR gene. They are:

C677T (also referred to as c.665C→T or p.Ala222Val)

A1298C (also referred to as c.1286A→C or p.Glu429Ala)

These MTHFR polymorphisms are so common that there are more people who have MTHFR polymorphisms than there are people who don't (48% of people have one MTHFR polymorphism, 36% have two, and only 16% have no MTHFR polymorphisms, that's less than one fifth of the population).



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## **MTHFR polymorphisms do not cause health problems**

Neither of the common MTHFR polymorphisms disrupt the making of the MTHFR enzyme. Having one or two copies of these polymorphisms may slightly reduce the efficiency of the MTHFR enzyme, but the effect is so small that even **people who have two MTHFR polymorphisms are unlikely to develop significant health problems as a result.**

## **Why does the MTHFR gene polymorphism test exist?**

Because low levels of the MTHFR enzyme may be one of many factors that can contribute to elevated levels of the chemical homocysteine in the blood, in the past it was thought that MTHFR polymorphisms might be responsible for a number of different health problems linked to homocysteine levels, such as blood clotting problems. However more recent research has revealed that MTHFR polymorphisms are not the cause of any significant health problems.

## **MTHFR gene polymorphism testing is not recommended**

Because MTHFR polymorphism testing does not provide information that is useful for a person's health, MTHFR testing is not recommended.

## **What if I've already had the test?**

For people who have just one MTHFR polymorphism (either one copy of C677T or one copy of A1298C) and for people who have two different MTHFR polymorphisms (say, for example, one copy of the C677T polymorphism and one copy of the A1298C polymorphism) there is no evidence to suggest any increased risk of any health problems at all. For people who have two copies of the C677T polymorphism, evidence shows the following:

- (1) A very small increase in the risk of having a stroke. This increase is so small that no special measures are recommended, but people in this category should avoid factors which have a much bigger effect on the risk of stroke, such as smoking and being overweight.
- (2) Women who have two copies of the C677T polymorphism have a slightly higher risk of having a baby with a neural tube defect such as spina bifida or anencephaly, however this effect disappears if the woman takes folate supplements. It is recommended that all women, regardless of their MTHFR status, take folate supplements (0.5mg per day) for a least 1 month prior to falling pregnant and for the first 3 months of pregnancy.
- (3) A person who has two copies of the C677T polymorphism has no greater risk of getting cancer than any other person in the general population. However a person with two copies of the C677T polymorphism may react differently to certain chemotherapy drugs such as methotrexate.

## **Should my relatives be tested?**

Because MTHFR polymorphism testing is unlikely to provide any useful clinical information, we do not recommend genetic testing for family members.

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