

Basic information about the MTHFR Gene

Most MTHFR testing is unnecessary.

Why? Many people have one or two genetic variants in the MTHFR gene. However, having a common variant in the MTHFR gene does NOT change your medical care.

What is the MTHFR gene?

MTHFR is a gene that makes an enzyme called **MethyleneTetraHydroFolate Reductase**. This enzyme works with a B-vitamin called folate. Together, MTHFR and folate help to reduce the level of homocysteine (a potentially harmful amino acid). Too much homocysteine in the body may be one risk factor for blood clots and heart disease. But MTHFR is not the only thing that determines homocysteine levels in the body. There are many other factors, both genetic and environmental, that determine how much homocysteine you have, and your risk for blood clots and heart disease.

I have an MTHFR variant. What does that mean?

Everyone has two copies of the MTHFR gene, one copy from each parent. If you've been told you have an MTHFR variant, it means you have a difference in either one or both copies of the MTHFR gene. The two most common MTHFR variants are **C677T** and **A1298C**. However, there are other variants that have also been found.

DID YOU KNOW?

The exact same genetic variant can go by more than one name.

- **C677T** has also been called c.665C→T or A222V or p.Ala222Val
- **A1298C** has also been called 1298A→C or G429A or p.Glu429Ala

Someone in my family has an MTHFR variant. Should I have testing?

There is no need to test your MTHFR status. Variants in the MTHFR gene are very common and finding one (or two) does not change your medical care. In 2013, the American College of Medical Genetics (ACMG) and the American Congress of Obstetrics and Gynecology (ACOG) advised **against** routine MTHFR testing. Since then, more professional medical groups have made the same recommendation.

How common are MTHFR variants?

MTHFR variants are found in people worldwide. In some ethnicities, the chance to have at least one MTHFR variant is as high as 50%. Between 10%-15% of the Caucasian population and more than 25% of the Latino population have variants in *both* copies of the MTHFR gene. One study on pregnant Chinese women found that about 1 in 3 of the women had two MTHFR variants.

What happens when an MTHFR variant is present?

The common MTHFR variants cause a minor change in the DNA code. This makes the MTHFR enzyme work a little slower than usual. If MTHFR works too slowly, homocysteine might start to build-up in the body. Homocysteine build-up is slightly more likely to happen when a person has two copies of the C677T variant. However, MTHFR variants only have a small impact on your total homocysteine level. Most people with variants in the MTHFR gene have normal levels of homocysteine.

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What type of medical problems can be related to MTHFR variants?

The relationship between the common MTHFR variants and many medical problems has been wondered about for decades. Some studies have suggested a possible risk for common medical problems. These include clotting problems, heart disease, stroke, high blood pressure, pregnancy complications, psychiatric disorders, autism, and certain types of cancer. These are all common conditions, that affect people with and without MTHFR variants. However, having an MTHFR variant does not predict your risk for any of these problems. Right now, it is unknown what role, if any, MTHFR variants play in these medical problems.

Does taking extra folate help a person with an MTHFR variant?

Folate is a vitamin our body needs, but there is no known benefit for a person with an MTHFR variant to take more than the recommended daily amount. It is important for everyone to get enough folate in their diet, regardless of their MTHFR status. It is especially important to get enough folate during pregnancy.

GENETIC TERMS:

Variant – A difference in the DNA code compared to the typical version of a gene.

Heterozygous - When a person has one typical gene and one genetic variant.

Homozygous – When both copies of the gene are the same.

Compound heterozygous – When a person has two different variants.

More about FOLATE and FOLATE SUPPLEMENTS

Folate is also called vitamin B9. It is found in the food you eat. Some foods high in folate include dark green vegetables (eg, spinach, broccoli, asparagus), legumes (lentils, beans, peas), and citrus fruits.

Folate supplements are the synthetic (man-made) forms of folate. The most common folate supplement is folic acid but there are also folic acid derivatives. These are a form of folic acid with slight chemical differences to make them easier for the body to absorb. If you do not get enough folate in the foods you eat, taking folic acid or a folic acid derivative makes sure your body has enough folate. Many breads and cereals have been fortified with folic acid. Prenatal vitamins usually include extra folic acid compared with regular vitamins.

Reference:

Hickey et. al., ACMG Practice Guideline: lack of evidence for MTHFR polymorphism testing. Genetics in Medicine. Jan 2013

The information is not intended to diagnose health problems or to take the place of professional medical care. If you have persistent health problems or if you have further questions, please consult your health care provider.