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# METHYLATION

## Part 4 of 4 – Methylation Issues

### Converting vitamins into an active form

As mentioned previously, our bodies can only utilize vitamins after they have been converted into the various active forms. If any of the steps in the chemical transformation process are compromised, the conversion will not be successfully completed. When that happens, our bodies may eventually become deficient of that particular vitamin. Yet if we ask our doctor to order a test to check the level of that particular vitamin, the result that's returned will usually be in the upper part of the normal range, and in some cases, it may be above the normal range.

This outcome is due to a transformation that failed during the conversion process. This allows levels of the inactive forms of the vitamins to build up, although the body may be starving for the active forms. The conversion process includes a step known as methylation, and if the methylation process is not properly completed, it's said that we have methylation issues. Research shows that roughly half the general public has methylation issues of one type or another.

### What exactly is methylation

Methylation is a simple chemical process that involves transferring one carbon and 3 hydrogen atoms (CH<sub>3</sub>) from one chemical compound to another. Methylene tetrahydrofolate reductase (MTHFR) enzyme regulates the methylation process, and the MTHFR gene contains the genetic code that defines the production of this enzyme. The possibility of a number of different mutations of the MTHFR gene exists, and various combinations of these mutations can result in a variety of methylation issues.

Our bodies produce S-adenosylmethionine (SAME), and SAME supplies the CH<sub>3</sub> needed for the methylation process. But the basic problem that leads to broad methylation issues in general, can be

found in the fact that SAME production depends upon the availability of the active form of folate, known as methylfolate (5-methyltetrahydrofolate, or 5-MTHF), and folate cannot be converted into methylfolate if we have certain methylation issues. Statistically, approximately 60% of us have one or more genetic mutations that compromise our ability to create methylfolate.

### **Compromised methylation can cause various symptoms**

According to Loy Anderson, MD (2019, January 15), undermethylation can lead to these symptoms:<sup>1</sup>

*“Fatigue is perhaps the most common symptom of problems with methylation. Other symptoms or conditions can include:”*

- Anxiety
- Depression
- Insomnia
- Irritable Bowel Syndrome
- Allergies
- Headaches (including migraines)
- Muscle pain
- Addictions
- Digestive issues
- Multiple miscarriages
- Autism



And he points out that, “Poor methylation can also increase your risk for conditions like osteoporosis, diabetes, colon and lung cancer, birth defects, dementia, stroke and cardiovascular disease.”

### **Many different MTHFR gene mutations are possible**

The degree to which our ability to complete the methylation processes is compromised, depends upon how many, and what type of, MTHFR gene mutations we have. In the worst cases, we may derive very little benefit from most ordinary vitamins, because our MTHFR gene mutations severely compromise our ability to convert vitamins into the active forms.



Some of us may have MTHFR gene mutations that only slightly compromise our ability to complete most methylation processes. Most of us who have these gene mutations will find that our methylation abilities lie somewhere in between these 2 extremes.

That implies that many of us may benefit by taking the active forms of certain vitamins, because our bodies may not be able to adequately utilize the inactive forms of those vitamins. Otherwise, we may only be able to derive a fraction of the benefits that normal people get, not only from ordinary vitamin supplements, but from the vitamins in our food, and the vitamins that are added to foods in order to enrich them, also.

### **Vitamins in the active form are sometimes prescribed**

For many years, doctors have been prescribing a product that uses the active forms of certain “B” vitamins to treat the nerve damage associated with peripheral neuropathy that diabetes patients sometimes develop. The product contains L-methylfolate (as Metafolin, a calcium salt of vitamin B-9), methylcobalamin (vitamin B-12) and pyridoxal 5'-phosphate (vitamin B-6). It's called Metanx, and it's described as a prescription medical food.

**Fortunately, lower cost, nonprescription alternatives are available**

For specifically treating methylation issues, Thorne research recommends the following 7 essential nutrients (Thorne, n.d.):<sup>2</sup>

1. *5-MTHF (active folate)*
2. *Methylcobalamin (active vitamin B12)*
3. *Pyridoxal 5'-Phosphate (active vitamin B6)*
4. *Riboflavin 5'-Phosphate (active vitamin B2)*
5. *Magnesium*
6. *Betaine (also known as trimethylglycine)*
7. *Vitamin D*

And they (Thorne Research) produce a dietary supplement called Methyl-Guard. This product contains:

1. *5 MTHF (folate)*
2. *Methylcobalamin (B-12)*
3. *Pyridoxal 5'-Phosphate (B-6)*
4. *Betaine*

They also produce another product called Methyl-Guard Plus that contains larger doses of all those ingredients, plus riboflavin (B-2). Note that some people take Metanx, or one of the non-prescription alternatives mentioned above, in order to enhance their cognitive abilities.



**MTHFR gene mutations can lead to buildups of toxins and heavy metals**

If unaddressed, some MTHFR gene mutations can compromise the body's ability to break down and eliminate toxins and heavy metals, which may allow those levels to build up. It's known, for example, that the inability to properly convert folate or folic acid into methyl folate tends to allow a buildup of homocysteine. Homocysteine has been shown to increase the risk of cardiovascular issues and dementia. And, of course, various other increased risks are possible if the levels of toxins and heavy metals exceed our tolerance thresholds. The solution of course, is to take a vitamin supplement that contains the active forms of the essential B vitamins mentioned above.

Please note that although most of the foregoing information is based on published medical research, some of it is based on epidemiological studies, and experiences shared by MC and other patients who are dealing with methylation problems. Many methylation issues are not yet well understood, so when attempting to utilize this information in order to resolve personal health issues, it may be beneficial to consult with a functional medicine physician. Otherwise, trial and error methods may be necessary.

**References:**

1. Anderson, L. (2019, January 15). Methylation. Thriven Functional Medicine Clinic, Retrieved from <https://thrivenfunctionalmedicine.com/methylation/>
2. Thorne. (n.d.). What is Methylation and Why Should You Care About it. Retrieved from <https://www.thorne.com/take-5-daily/article/what-is-methylation-and-why-should-you-care-about-it>