MTHFR Mutations: Functional & Nutritional Intervention Strategies

Genetic research has uncovered some amazing *new facts that could make a big difference for your health and quality of life*. Many suffer from a myriad of health issues that doctors historically have no answer for. Through the Human Genome Project's discovery of MTHFR, a new treatment is available as is a scientific explanation for why so many of us suffer poor health. Studies indicate that *about 40% of American's have one copy of this* genetic defect called MTHFR (or Methylenetetrahydrofolate Reductase). Another 30% of the population has two copies of this mutation resulting in even greater potential health risk. Two copies of this gene mutation results in a 70-90% decrease in the normal function of critical enzyme pathways. This results in a dramatic increase in risk of many health problems. One copy of this gene mutation results in a 30 to 45% reduction of the same enzyme pathways resulting in moderately compromised methylation function. Even one copy of this MTHFR gene mutation greatly limits the potential to activate methylation pathways during times of increased need, such as puberty, healing from injury, surgery, infections, menopause, stress or increased exposure to toxins.

This MTHFR gene mutation affects how our bodies process B vitamins for absorption and utilization; this biological process is called methylation. Methylation is simply the transformation of key nutrients into the "activated forms" that our cells can actually use to repair and restore the body towards optimal health. Specifically, methylation is the enzymatic attachment of a methyl group (a small group of chemicals - one carbon with 3 hydrogen atoms) to a larger chemical like a protein, DNA or a vitamin. The ability to methylate is critical to every aspect of health. For instance, cancer has been referred to as a state of "global under-methylation". In other words, inadequate methylation anywhere in the body will typically increase whatever tendency we have for cancer. Optimal methylation actually turns cancer causing genes off!

Patients with this gene mutation have significantly reduced MTHFR enzyme activity and therefore require greater supplemental intake of methyl folate, methyl B12 and other cofactor nutrients discussed below.

This mutation does not necessarily lead to health problems especially if a healthy lifestyle is followed along with effective stress management and avoiding exposure to environmental toxins. However, unknown risk factors, additional genetic mutations, and any form of stress or illness significantly increases health risk if this mutation is not addressed effectively.

In addition, low levels of methyl folate and methyl B12 may lead to greater risk of many symptoms and health problems. Therefore it is recommended that only specific forms of methylated folate and B12 be used in supplementation. Do not use any supplement with folic acid as this can lead to accumulation of un-metabolized folic acid that may be related to increase cancer rates and lowered NK immune cell activity. Also avoid refined grains like white flour, white rice , which are "enriched"

with folic acid.

The body cannot use folic acid for most of the critical functions until it is activated into methyl folate. Folic acid must get converted into methylfolate before the body's cells can use it to repair DNA, make brain neurotransmitters, detoxify heavy metals, detoxify old estrogens, and protect the nervous system. This conversion from folic acid to folate and then to methylfolate is a 4-step process, but if someone has an MTHFR genetic defect, then the enzyme transformation between steps 3 and 4 is mutated thus causing many system wide problems in every cell of our body. Essentially, due to defective enzymes caused by the MTHFR and other mutations, the vitamin processing pathways are NOT functioning properly, increasing the chance of your body to malfunction and display a variety of symptoms and diseases. These B vitamin pathways are responsible for many foundational health processes:

1) clearing the body of toxins (making glutathionine to do this job),
2) regulating central nervous system health (making serotonin, dopamine, norepinephrine to do this work),
3) regulating cardiovascular health (reducing homocysteine levels which are so damaging to the heart)

There are two well-known MTHFR gene mutations and they can cause a lot of health problems:

Mutation MTHRF C677 – Heart disease, heart attack, Stroke, Blood clots, Peripheral neuropathy, Anemia, Miscarriages, Congenital birth defects, and more.

Mutation MTHRF A1298 – Depression, Fibromyalgia, Chronic Fatigue Syndrome, Migraines, IBS (Irritable Bowel Syndrome), Memory loss with Alzheimer's and Dementia, even other psychiatric problems can be tied to this defect (OCD, Bipolar, Schizophrenia), and more.

Even symptoms of toxin build up may be linked to one or both of the MTHFR defects - nausea, diarrhea, abdominal pain, liver and kidney dysfunction, hypertension, tachycardia, pulmonary fibrosis, asthma, immune problems, hair loss, rashes, and much more.

If you want to hear a much more detailed explanation of this genetic mutation and its effects from a very reputable doctor, watch Dr. Neil Rawlin's video at http://vimeo.com/33039195. He was inspired to study the biological pathways in depth to find an answer because his son was dying. Dr. Rawlins was looking for a cure and did indeed find one, not only for his son, but also for his entire family that carried a significant variant of the mutated MTHFR gene.[1]

Nutrigenomics is the science of wisely using nutrition to effectively influence a healthier expression of our genes. There are five main variations of the two primary MTHFR mutations. Each variation requires "fine tuning" of the protocol in order to further support the goal of nutritionally bypassing the genetic mutation and helping

[1] Adapted from Jamie Horn's article at www.methyl-life.com.

restore normal function to the metabolic pathways in every cell. For establishing an appropriate personalized protocol an office or phone consultation is strongly recommended.

Here are the general nutritional strategies I recommend to optimize health and minimize the risk associated with the MTHFR mutation.

1. **Optimize Digestion**. Without a healthy digestive system we cannot be healthy. When poor digestion is present our entire body and all organ systems become compromised. Many will need to use **Betaine HCL** to support healthy hydrochloric acid (HCL) activity in the stomach at meal time. Adequate acid in the stomach at meal time activates digestive enzymes and optimized absorption of vitamins and minerals. Betaine is also a key nutrient that helps convert Homocysteine to Cysteine and thus helps neutralize the toxic effect of the MTHFR mutation.

   Since H. Pylori bacterial infection in the stomach is very common in those with MTHFR mutations, it may be helpful to test for the H Pylori Urea Breath Test; H Pylori IgG antibodies (see if the immune system is fighting it thus indicating it's presence); H Pylori antigen stool test to see if the stool has the bacteria in it. If this bacteria is present, it should be treated with prescription antibiotics or with **Pyloricil** - herbs and nutrients known to help the body heal the H Pylori infection.

   To minimize toxins released by pathological bacteria in the colon, use **Orthobiotic** one daily with a meal – a probiotic containing 8 strains of healthy bacteria, totaling 60 Billion cell forming units per capsule. Even after a year of being on a shelf without refrigeration, it is guaranteed to have a minimum of 20 Billion CFUs per capsule!

2. Take a high potency multiple that uses optimal doses of folate and B12 but only in the necessary methyl forms. Do not use supplements that simply list Folic Acid or B12 without listing Methyl or Quatrefolate (methylated form) on the label. **Young Life Complete**: Take 2 capsules three times daily with meals as a multiple designed for daily immune, metabolic and detox support. This combines the benefit of a high potency multiple vitamin/mineral nutritional, 1,000mcg of B12 Methyl Cobalamine, 1,000mcg of methylated folate, 50mg of B6, 600mg of N-Acethyl L-Cyteine, 500mg Acetyl L-Carnitine, 200mg of Alpha Lipoic Acid, as well as comprehensive nutrient support for the process of detoxification. Replaces K-PAX multiple, FolaPro and B12 MethylColbalamine. Children may use 1 capsule twice daily for every 50 pounds body weight. For example, a 75 pound child could take once capsule with each meal (3 times daily).

3. Consider use of additional methylfolate as **FolaPro** 800mcg per tablet. May need one to three tabs daily in divided doses to optimize methylation pathways.

4. Be aware of **drugs and nutrient interactions** that can effect the absorption or bioavailability of methylfolate and methylcobalamine (B12).

Antibiotics may alter the intestinal microflora and may decrease the absorption of methylcobalamin.

Cholestyramine, colchicines or colestipol may decrease the enterohepatic re-absorption of methylcobalamin.

Metformin, para-aminosalicylic acid and potassium chloride may decrease the absorption of methylcobalamin.

Nitrous oxide can produce a functional methylcobalamin deficiency. Several drugs are associated with lowering serum folate levels or reducing the amount of active folate available.

Many form of anticonvulsants may decrease folate plasma levels.

Methotrexate, alcohol (in excess), sulfasalazine, cholestyramine, colchicine, colestipol, L-dopa, methylprednisone, birth control pill, NSAIDs (high dose), pancreatic enzymes (pancrelipase, pancratin), pentamidine, pyrimethamine, smoking, triamterene, and trimethoprim may decrease folate plasma levels.

Warfarin can produce significant impairment in folate status after a 6-month therapy.[2]

5. Evaluate and address associated broader health risks via **comprehensive lab testing.**[3]

6. Evaluate baseline and follow-up **functionality of methylation pathways** with specific lab tests.

7. **Evaluate hormone panels** to insure that proper hormone balance is present as a necessary component of normal methylation and detoxification reactions. Post menopausal women may benefit from natural, bio-identical **progesterone cream** and also from **Estrovera**, a special form of resveratrol from the Chinese herb - rhubarb root. Girls may have premature breast development and other signs of precocious puberty due to exposure to environmental estrogens that their body is unable to methylate and detoxify effectively. Premature puberty often limits how tall the girl will grow compared to their genetic potential. More importantly it can have significant effects on future health and disease tendencies.

8. **Evaluate exposure and individual susceptibility to environmental toxins**. Bisphenol A (BPA) is a pervasive toxin released from plastics that now affects all animals and humans. We are all exposed to clinically significant amount of this and other environmental toxins.[4] The challenge is that 70% of us have one or more copies of the MTHFR gene mutations which in turn decreases our ability to neutralize and remove toxins from our body effectively.

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[2] Adapted from Metanx package insert.

[3] Chapter 10, Looking at the big picture (comprehensive lab testing). *Goodbye Diabetes: Preventing and reversing diabetes the natural way.*

[4] Chapter 22, Fight Hidden Culprits (the role of environmental toxins in health). *Goodbye Diabetes: Preventing and reversing diabetes the natural way.*

9. **Eat berries regularly**. Berries are one of the only reported foods to contain the methylated active form of folate. But continue to supplement the active form as well. It takes between 10 and 20 cups of the most folate potent berries to get 1,000mcg of activated methylfolate.
   The predominating folate form was 6S-5-CH_3-H_4folate in all tested berries (>95%). This is the biologically active folate form (6S-5-CH_3- H_4folate) The folate content in nine selected Swedish berries varied from 11 to 96 µg/100 g (fresh weight) and the highest folate content was found in rose hips (96 µg/100 g) and strawberries (74 µg/100 g). Moderate folate sources were raspberry (46 µg/100 g) and sea buckthorn (39 µg/100 g), whereas all other tested berries contained about 20 µg of folate/100 g or less.[5]

10. **Be a First Class Foodie!** In other words eat largely from unprocessed whole plant foods. These foods not only have many important nutrients not found in processed foods but also are devoid of all the mild toxins added to foods during the refining and packaging process. It is important to note that consumption of refined grains, white flour, etc… will increase the toxic load on the body.[6] While eating as clean and naturally as possible is critical to optimal health, it will not in of itself fully neutralize the MTHFR mutations so common in humans.

    Fortunately, since the Human Genome Project was completed just over a decade ago, we have access to labs and risk assessment strategies that were previously relegated only to science fiction fantasy. We are now well on the road to fixing the previously unfixable. The key is in properly applying nutrigenomics (nutritional intervention on gene expression and metabolism). Cicero once wrote, "Old age must be resisted and it's deficiencies supplied." Through scientific breakthroughs in genomic medicine we can add the following corollary to Cicero's words, "Genetic mutations must be resisted and it's deficiencies supplied". DuPont's slogan "Better living through chemistry" is now more possible than ever. Genomic lab testing now makes it possible for us to have "Better health through nutritional biochemistry"

11. **Support your Mitochondria!** For optimal cellular energy and function, we must support mitochondria. These are the little organelles which act as "energy factories" taking sugar and fat and converting them into actual cell energy in the form of ATP. Two of the best ways to improve cellular energy is to use **CoEnzyme Q10** 75mg twice daily and **L-Carnitine Tartrate** 500mg twice daily. This should be done at the very start of any program to "fix" MTHFR gene mutations.

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[5] European Food Research and Technology, March 2003, Volume 216, Issue 3, pp 264-269

[6] Chapter 13, Be a First-Class foddie. *Goodbye Diabetes: Preventing and reversing diabetes the natural way.*