

Faulty Methylation

Methylation is what occurs when your body takes one substance and turns it into another, so it is detoxified and can be excreted from the body.

Methylation is a process that occurs one billion times per second, it takes place in the liver during phase two detoxification. A methyl group is a carbon atom with three hydrogen atoms attached to it. Methylation occurs when S-adenosine methionine (SAME) donates a methyl group, which is then attached to the molecule that is being detoxified. SAME then becomes homocysteine. Vitamin B6, B12, and folic acid are necessary to reduce homocysteine and keep the methylation process occurring.

Faulty methylation has been linked to heart disease, stroke, neural tube defects, Alzheimer's disease, colon cancer, reproductive cancers, kidney infarct, cervical dysplasia, faulty detoxification and impaired DNA repair. When you have poor methylation your body's levels of homocysteine will elevate. Homocysteine is an amino acid that is toxic to the body. Dr. Kilmer McCulley (author of "The Homocysteine Revolution"), discovered that high levels of homocysteine caused heart disease and stroke in animal studies. He then found that B vitamins decreased the homocysteine levels, and therefore stopped the heart disease process. Our society has the mind frame that cholesterol is the biggest factor to heart disease, but only 40% of people who have heart attacks have any of the standard risk factors. Could the cause be homocysteine?

According to the "Lancet" 1980 poor methylation will cause neural tube defects. It was found that mothers who had children with neural tube defects from a previous birth, who took a multivitamin had a 1:178 incident of repeated neural tube defects, where the control group with no multivitamin had a 5:260 incident of neural tube defects. In 1991 the "Lancet" reported that folic acid was the nutrient that prevented neural tube defects. In the "Journal of the American Medical Association" 1992 it was found that low folic acid levels increased the incidence of cervical dysplasia. It was also discovered that folic acid supplementation could stop the process and even reverse it. The "Journal of Nutrition" year 2000, reported that the lower the levels of folic acid and vitamin B12 the more severe the cervical dysplasia. In 1988, the "New England Journal of Medicine" stated that lower levels of folic acid and vitamin B12 increased the incidence of Alzheimer's. This is because folic acid and vitamin B12 are needed for phospholipid synthesis in the brain.

Methylation is also used in DNA. Every cell in your body has the DNA for every other cell, but your liver cell doesn't make a heart cell. This is because methyl groups turn off the DNA we don't want our bodies to read. If you have poor methylation your body will start to take the methyl groups off of your genes to use for other purposes. Now if that methyl group was removed from a cancer gene, it may begin to express cancer. This is how methylation turns off your oncogenes and your metastatic promoter genes. The "Journal of Nutrition and Cancer" year 2000, stated that cancer

cells have lower levels of folic acid and vitamin B12 and therefore lower levels of methylation. "Journal of Carcinogenesis" year 2000, states that methylation is needed to mask DNA as well as repair DNA.

Approximately one trillion molecules of oxygen passes through every single cell in our body in a 24-hour period. This equals approximately 100,000 free radical hits on our cellular DNA. 99 to 99.9 percent is repaired by methylation. Approximately one-third of people have the 677 C to T polymorphism (which can be tested through [genomics](#)). This doesn't allow them to convert folic acid to the activated form of 5 methyl tetrahydrofolate, which is needed to make the enzyme 5 methylene tetrahydrofolate reductase. This is the enzyme that is needed to remove homocysteine. Individuals who have this genetic polymorphism will have an increased risk of the above mentioned diseases.