METHYL DONORS

DEFINITIONS AND CLINICAL INDICATIONS OF NEED

(A Brief Overview)

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Do you want to slow the aging process…

Would you like to increase your mental capabilities…

Or prevent CAD…

Not interested in having cancer…

THEN LET'S TAKE THE MYSTERY OUT OF METHYL DONORS

By definition, a methyl donor is a substance capable of donating a methyl group (CH3), such as methionine, betaine (bay' ta ine) or trimethylglycine (according to the MERCK INDEX, these are different names for the same substance), dimethylglycine or choline. Essential to the *transmethylation* process are the coenzymatic forms of the vitamins folic acid (FH4) and B12.

Methyl donors are involved in a biochemical process known as methylation, the transfer of a methyl group from a donor molecule (see above) to an acceptor molecule such as homocysteine. Because of this, much research has been directed at the use of methyl donors to lower homocysteine levels and prevent coronary artery disease (CAD). Thanks to the work of McCully and Stampfer, elevated homocysteine is now recognized as a major risk factor for CAD. But this is just the tip of the iceberg, enhancing the methylation process can not only prevent an untimely death from a heart attack or stroke, it can contribute to our increased creativity, productivity and overall enjoyment of a longer life. As the saying goes, *not just more years of life, but more life in those years!*

Increased homocysteine has become an easily definable marker of inhibited or poor methylation.

RISK FACTORS FOR INCREASED HOMOCYSTEINE AND POOR METHYLATION

Persons who exercise less than three times a week?

Homocysteine is reduced during exercise. Why it is reduced during exercise is not known

A significant part of the diet is from a bag, box or can or fast food.

Processed foods contain a fraction of the critical vitamins, B-6, B-12, and folic acid. These nutrients are required to lower homocysteine and prevent cardiovascular disease.

Family history of death from vascular disease.

This could be due to a family genetic weakness in the body's ability to lower homocysteine and premature vascular disease. If parents, grandparents, aunts, or uncles suffered from strokes, heart attack, angina, or any vascular disease, an increased risk for vascular disease exists even if all standard risk factors are normal. The good news is, researchers have discovered that betaine (TMG), combined with B-6, B12, and folic acid, can prevent much of the damage created by this defect. (The original work by McCully was based on children with vascular disease. Increased homocysteine [due to a genetic defect], not cholesterol, was shown to be the cause. *McCully, K.S. Vascular pathology of homocysteinemia: implications for the pathogenesis of arteriosclerosis. American Journal of Pathology 56:111-128, 1969.)*

High protein, few fruits and vegetables in diet

Research has shown that a high percentage of Americans have never heard the government's recommendation to eat five servings of fruits and vegetables each day.

Family history of depression, neurological disease or liver problems.

Person smokes or uses birth control pills.

Both smoking and birth controls pills elevate homocysteine levels and therefore inhibit methylation.

For patients at risk, the good news is, through nutrition, homocysteine can be reduced and methylation can be increased. Even people with previously diagnosed vascular disease have survived dependent on their homocysteine levels.

METHYLATION--BEYOND HOMOCYSTEINE

Methylation is a process necessary for many biological functions aside from homocysteine regulation. Methylation is involved in maintaining DNA integrity, processing fats, improving neurological function, detoxifying the liver, and is connected to nearly every biochemical process in the body. Several scientific peer-reviewed articles have demonstrated that this methylation process degrades with age, and is associated with a large variety of age-related diseases. Enhancing the methylation process with nutrition holds great promise for the future with regard to reduction in age-related disease and the overall increased longevity of man. Research is showing that the most effective method of enhancing methylation is through the use of **food supplements**. *Diet has not been shown to be an adequate means of providing the nutrients required for methylation in the amounts needed.* (van den Berg, M., et al. Combined vitamin B6 plus folic acid therapy in young patients with arteriosclerosis and hyperhomocysteinemia. *Journal of Vascular Surgery*, 20(6):933-40, 1994. Graham, I.M. et al. Plasma homocysteine as a risk factor for vascular disease. *Journal of the American Medical Association,* 277(22):1775-1781, 1997.)

SLOWING THE AGING PROCESS

There is strong evidence for the theory that impaired methylation is one of the key mechanisms of aging. Just as long-lived animals have strong antioxidant defenses, they maintain methylation much better than short-lived animals. If we were to envision a curve showing the inexorable rise in homocysteine with aging it would depict the peripheral blood vessels clogging up first, then we seem doomed to end up with homocysteine-related damage to the nervous system, bone density, cataracts, gray hair--the very changes that define aging. The development of cataracts is related to rising levels of homocysteine, and inadequate methylation. Graying of the hair has been related to inhibition of the methylation process. As we age, is it possible to reduce homocysteine levels and enhance methylation? The answer is YES! Elderly people were supplemented with nutrients involved in methylation (folate, B12, B6, TMG), at the end of the study they had homocysteine levels lower than usually seen in healthy 35 year olds. (*Cooney, C.A., Growth, Development and Aging, 57(4):261-73, 1993.*) Since homocysteine levels are currently being used as a marker of the efficacy of the methylation process the results of this study seem significant.

METHYL DONORS AND THE BRAIN

The brain is insatiable in its demand for methyl donors. For the production of neurotransmitters and maintaining the myelin sheath around nerve fibers, these nutrients are essential. Nutrients involved in the methylation process have been found to be effective anti-depressants as well. Interestingly enough, lack of response to Prozac goes hand in hand with reduced folate levels. Alzheimer's disease has been associated with high homocysteine and low levels of folate and B12. Improving methylation is probably one crucial way to protect ourselves against devastating brain diseases and give us years of continued creativity and productivity. Multiple sclerosis (MS) has symptoms that resemble those of folate or B12 deficiency. Since methylation is essential for the formation of the myelin sheath that insulates nerve fibers, a combination of methyl supplements and anti-inflammatory fatty acids could be used for the treatment of this disease. (*Cooney, C.A.*)

ENHANCE CARDIOVASCULAR HEALTH

Research has shown that even moderately high levels of plasma homocysteine are associated with subsequent risk of MI independent of other coronary risk factors. Because high levels can be easily treated with vitamin supplements, homocysteine may be an independent modifiable risk factor. Elevated homocysteine levels can often be normalized with modest doses of folate (1 - 5 mg/d). For cases that are resistant to this therapy, the addition betaine (TMG) is often effective. These supplements at recommended doses have no side effects under most circumstances. (*Stampfer, Meir J., et al. A prospective study of plasma homocysteine and risk of myocardial infarction in US physicians. Journal of the American Medical Association, 268(7):877-81, 1992.*) This is significant because some researchers estimate that as much as 90% of CAD may be due to increased homocysteine! A valid question at this point might be what is considered *increased* when it comes to homocysteine. There seems to be some agreement that levels of 4 - 6 mmol are probably safe. This range may be lower than the "normal" range reported by your laboratory. It is probably better to be safe than normal with a one out of three death rate from CAD.

CANCER
Given that the methylation process is a integral part of normal cell replication, it is not hard to see how inhibited methylation could be involved in this pathology.

SUPPLEMETATION
OOrganik 15 Contrary to popular belief this is NOT vitamin B15 or pangamic acid!! It does provide a source of the premier methyl donor, betaine or trimethylglycine. Other product sources of this are **Beta TCP**, **Beta Plus** and **Bio GGG-B**.

Folic Acid 800 Contains 800 mcg of folic acid and 12 mcg of B12.

B12 2000 Lozenges Contains 2000 mcg of vitamin B12 (as cobalamin), folic acid 800 mcg, and 2 mg of vitamin B6 (as pyridoxal-5-phosphate).

B6 Phosphate Contains 20 mg of vitamin B6 as p-5-p.

Dosage of the above supplements is based on patient homocysteine levels. All could be safely dosed at 2 tablets or lozenges t.i.d. to start with the dosage reduced as homocysteine levels decrease.

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