

## Homocysteine Elevation

Homocysteine is an amino acid, a naturally occurring chemical in the body, formed by the conversion of Methionine to Cysteine, part of the methylation pathway. It has been thought for some time that homocysteine may irritate blood vessels, promoting the process of atherosclerosis (hardening of the arteries). Large elevations occurring as a genetic abnormality, are known to cause major medical problems, notably DVTs, and recently, that even mild elevations in plasma homocysteine levels may also cause a significant increase in cardiovascular risk, both in heart attacks, strokes and dementia. More recently it looks to be implicated in the production of at least some (perhaps all) migraines.

Homocysteine appears to alter cholesterol to oxidized low-density lipoprotein, which is damaging to the arteries, plus it can cause an increased susceptibility to clotting. If the current research on Toll-like receptors is correct, it may be part of the inflammatory changes that are really at the root of arterial damage. If your homocysteine level is too high, it may be because you have inadequate amounts of the enzymes required to deal with it, or the levels of appropriate vitamins to process it.

It has however, been demonstrated, that the homocysteine levels in the blood can often be reduced by an increased intake of appropriate B group vitamins, usually Methylated B12. These are essential co-factors in the remethylation of homocysteine to methionine in the "Methylation Pathway. Immune activation appears to be involved strongly in atherogenesis as well as in other diseases found to be associated with moderate hyperhomocysteinaemia. Evidence so now points towards participation by the innate immunity of the body through the Toll-Like Receptors (threat receptors) in the cause of the problem.

Methionine is present in large amounts in diets high in animal protein and low in fruit, grains and vegetables. Homocysteine levels increase with increasing age, and are higher in males than females. Levels are higher in post-menopausal women, and have been shown to decrease with hormone replacement therapy. This finding may relate to the reduced arteriosclerosis that occurs in women on HRT, as it is well-known that the risk of arteriosclerosis increases significantly in women from the menopause. There have been no studies I am aware of to confirm this with homocysteine.

The issue of homocysteine is indeed a complex and difficult one, so much so that the American College of Cardiologists has recommended against routine checking of it, as they felt dealing with bigger issues of things like obesity, hypertension, smoking, diabetes was far more important!!!

My interest has been with food intolerance, and in this group (around 30% of the Australian population), there is a frequently a defect in the methylation pathway causing low levels of vitamin B12, vitamin D, and often Zinc, Iodine and Iron. In this group, homocysteine is frequently elevated, and most respond to adequate diet change with avoidance of the foods that are triggering the TLRs and added vitamins. Many of this group have the positive tests to those very auto-immune diseases eg Hashimoto's Thyroiditis, that are known to affect homocysteine. Changing the diet frequently improves these abnormal tests.

Many people have higher than normal "homocystine" levels, so that the "normals" quoted by pathology companies (usually 0 to 15 mmol/l, ) are incorrect, as we know that there is a doubling of cardiovascular risk when your level is over 9.0. Surely the normal is 0 to 9 mmol/l! So the "normals" are really averages, which really says there is a lot of this problem in the

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community. It is also impossible to say what is normal is vitamin B12 levels. The low level of the quoted normal is simply too low, and at this levels there are frequently neurological problems starting to occur, eg migraine and neuropathy. I normally look at a "normal" vitamin B12 as being 400 or over, but as there is no real normal. If I add vitamin B12 (orally, lozenge or intra-muscular injection) to someone with an elevated homocysteine, if the homocysteine goes down, does it matter what the B12 is?

It is not cut and dried. The Toll-like receptors (TLR's) are involved, but in what way? The merging of the inflammatory and autonomic pathways is discussed in depth in other articles. But which is the cart and which is the horse. I can only suggest that this is all a work in process.

The people who have elevated homocysteine with normal vitamin levels, and do not respond to a trial of vitamin therapy, are more difficult, and in these people, correction of any other risks is important. And then there is the unknown- is the homocysteine in these people caused by factors as yet unknown, or by arterial damage already present.

Watch this space is all I can suggest as we learn more about this puzzling problem.