



Homocysteine - Its Role in Bone Loss and Heart Disease

by Charlie Skeen

The human body normally goes through thousands of chemical processes on a daily basis. One such process is the conversion of an amino acid methionine into a substance called homocysteine which is then converted back to methionine and another amino acid called cysteine. This process is normal and harmless if the body is functioning properly and has the necessary co-factors involved in the conversion process. If the conversion process is hampered allowing homocysteine to accumulate in the body, then the risk of heart disease and bone loss are increased.

Source of Methionine

The source of the amino acid methionine, one of the essential sulfur amino acids, comes from the foods we eat, especially high protein foods such as fish, chicken, turkey, red meat, eggs, whole milk, cheese, ricotta, yogurt, sausage meat, luncheon meat, duck, chocolate, granola, sunflower seeds, oat flakes, pork, wild game, avocado, and cottage cheese. After we eat the concentrated protein, our digestive system breaks down into di, tri, and single peptide amino acids making them easier for absorption into the blood stream by way of the villi in the small intestine.

Three Co-Factors Required to Convert Homocysteine

Once the methionine enters the blood stream, the body will convert it into homocysteine and then into methionine and cysteine. For this conversion to take place the body requires adequate amounts of three B-vitamins, folic acid, B-6, and B-12.

Conversion Process Summary

Methionine into Homocysteine requires Folic Acid and B-12.

Homocysteine into Methionine requires Folic Acid and B-12.

Homocysteine into Cysteine requires B-6.

If there are insufficient amounts of these vitamins - folic acid, B-6, and B-12, the conversion will not take place resulting in elevated homocysteine levels as found in one study of men where these three co-factors were suboptimal - 56.8 percent for folic acid, 25 percent for B-6, and 59.1 percent for B-12. (1)

Even where there is adequate folic acid levels homocysteine was still elevated because of insufficient amounts of B-6 and B-12 showing the synergistic relationship of these three B-vitamins.(2)

Coffee Elevates Homocysteine

Besides coffee's acidifying effects on the body causing dehydration and depletion of vitamins and minerals, it also contributes to increased homocysteine levels. In a study comparing the homocysteine-raising effects of caffeine pills, just coffee, and a placebo, it was discovered that the caffeine only increased homocysteine by 5 percent more than the placebo, while just the coffee raised it by 11 percent. (3) Now people have another good reason to quit drinking coffee.

Homocysteine Interferes with the Bone Building Process

Homocysteine contributes to osteoporosis, bone loss, by interfering with the body's collagen cross-linking which causes a defective bone matrix. As a result, the normal bone-building process is severely diminished.

Studies Reveal Increased Bone Loss with Elevated Homocysteine

In a study of 2,406 men and women over the age of 55, those with the highest levels of homocysteine had twice the risk of hip fracture. (4)

In another study of 1,999 men and women, the men with the highest homocysteine levels were almost four times more likely to sustain a hip fracture than the other subjects and the women were twice as likely to sustain a hip fracture. (5)

Homocysteine and Cardiovascular Disease

Homocysteine contributes to cardiovascular disease by reducing the strength of the artery by damaging the wall causing atherosclerosis (formation of plaque) resulting in reducing and blocking blood flow.

Higher Risk for Stroke and Heart attack

In approximately twenty to forty percent of people with heart disease, their homocysteine levels are elevated. (6,7)

Postmenopausal Women Have Higher Homocysteine Levels

Researchers have found that postmenopausal women have higher than normal homocysteine levels which they feel is contributing to postmenopausal cardiovascular disease and osteoporosis. The theory is that as their hormones change it could be affecting the production of enzymes that assist in the conversion process.

Folic Acid Supplementation Reduces Homocysteine in Postmenopausal Women

When postmenopausal women with high homocysteine levels were given folic acid their levels dropped. The interesting thing is that standard laboratory tests showed that none of the women were deficient in folic acid. (8) But since B-6 and B-12 are also required for the conversion of homocysteine into the harmless amino acids methionine and cysteine, they should be included as well for better results. (2)

Stress and Other Factors Contributing to Loss of B-Vitamin Co-Factors

We live in a world today that is very stressful. This excess stress uses up our B-vitamins very quickly. Also, what we eat and drink destroys them as well: chlorinated water, excess alcohol, processed foods such as pastries, white flour and rice, fried foods, coffee, smoking, and candy, cakes pies, sugar, and excess fats. Even some medications prescribed by physicians destroy the B-vitamins.

Program to Reduce Homocysteine

It is clear that the best way to reduce homocysteine and the resulting bone loss and cardiovascular disease is to take better care of our health by drinking high quality water free of chlorine and fluoride and eating healthier foods that supply us with the natural B-vitamins and other nutrients that feed and nourish our heart and bones.

Supplementation Recommended

Besides eating well, it is recommended to supplement the three B vitamins folic acid, B-6, and B-12 either by taking them separately, as a B-complex supplement, or as part of a high quality multiple.

If you are not taking a multiple and you would like to supplement these three B vitamins with one, please take time to examine the information on [Live Well Naturally's multiple](#) which contains well-absorbed forms and nutritionally meaningful amounts of 30 essential vitamins, minerals, antioxidants, and trace elements, including folic acid, B-6, and B-12. Also, if you are taking a multiple now, you may want to make a comparison.

Whatever way you choose to take these three B vitamins remember it is part of a healthy lifestyle to control homocysteine, thereby reducing the risks of heart disease and bone loss.

References:

1. J. B. Ubbink et al., "Vitamin B-12, Vitamin B-6, and Folate Nutritional Status in Men with Hyperhomocysteinemia." *American Journal of Clinical Nutrition* 57 (1993):47-53
2. J. B. Ubbink, W. J. van der Merwe, and R. Delport, "Hyperhomocysteinemia and the Response to Vitamin Supplementation," *Clin Invest* 71 (1993):993-98
3. Verhoef P. Pasma W. J., et al., "Contribution of caffeine to the homocysteine-raising effect of coffee; a randomized controlled trial in humans." *American Journal of Clinical Nutrition* 2002;76(6):1124-5
4. Van Meurs JB, Dhonukshe-Rutten Ra, Pluijijm SM, et al. Homocysteine levels and the risk of osteoporotic fracture. *New England Journal of Medicine* 2004 May 13;350(20):2033-41
5. McLean RR, Jacques PF, Selhub J. Et al. Homocysteine as a predictive factor for hip fracture in older persons. *New England Journal of Medicine* 2004 May 13;350(20):2042-9
6. C.J Glueck et al., "Evidence That Homocysteine Is An Independent Risk Factor for Atherosclerosis in Hyperlipidemic Patients," *American Journal of Cardiology* 75 (1995): 132-6.
7. R. Clarke et al., "Hyperhomocysteinemia: An Independent Risk Factor for Vascular Disease," *New England Journal of Medicine* 324 (1991): 1149-55.
8. L. E. Brattstrom, B. L., Hultberg and J.E. Hardebo, "Folic Acid Responsive Postmenopausal Hyperhomocysteinemia." *Metabolism* 34 (1985):1073-1077

The information in this article is not intended to provide medical advice, which should be obtained from a medical professional, and has not been approved by the U.S. FDA. Copyright© 2004 by Live Well Naturally.

Disclaimer: The use of information found in Live Well Naturally Newsletter for commercial purposes is prohibited without the written permission of the author.