NEWS YOU CAN USE

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CALCIUM AND MAGNESIUM

Lifelong bone health... and much more.

It is not entirely clear when humans first connected their personal bone health to what they were eating. In fact calcium wasn't even identified as an element until the 1800's. Its connection to the growth and development of bones and teeth came even later, in the early 1900's and its use as a nutritional supplement not until after World War II. So, in relative terms we've only known about the importance of calcium to bones a very short period of time. The inter-relationship of magnesium and other nutrients with calcium in bone health is still a relatively new understanding with fresh discoveries occurring regularly.

ESSENTIAL TOGETHER FOR EVERYONE'S BONES!

For the maintenance of bone growth and health, and the prevention of osteoporosis, a very important factor is the availability of key dietary nutrients, especially calcium and magnesium. Emerging research continues to not only validate the necessity of these nutrients to bone health, but is more importantly, demonstrating their synergistic effects.

In 1999, researchers showed that chronically low blood levels of potassium and calcium may actually be attributed to magnesium deficiency, prompting researchers to conclude that magnesium supplements could help correct potassium and calcium deficiencies. [1]

Too little magnesium has also been implicated in osteoporosis. With more than two-thirds of Americans failing to achieve magnesium sufficiency some researchers now believe magnesium insufficiency is a major contributor to bone density loss.

Normally, bone density decreases by 3 to 8% per year in the early years of menopause, and increases during that time are unusual. Data published in the November 2005 issue of the Journal of the American Geriatric Society found that women in early menopause who were given 250 to 750 mg of magnesium per day for one year had an increase in bone mineral density in 71% of cases. [2]

Additionally, in December 2006, researchers from the Yale University School of Medicine showed that daily supplementation with 300 mg of magnesium in girls, ages 8 to 14 resulted in significant increases in bone mineral content in just one year.[3] This is particularly important as more than one-third of adult bone mass is created during puberty and if this opportunity is missed, the body may never catch up.

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I'm continually struck by the scale and scope of the biodynamics (speed of life) of the human body. Trillions of cells, each performing about 100 million metabolic events per second, every hour of every day. These numbers defy comprehension yet put into perspective the controlled, contained and orchestrated "explosion" of activity that is life. Our skeletal system, and bones in particular have amazing biodynamic realities of their own.

Our bones are in a constant state of construction and destruction, never dormant, always changing. Osteoblasts, the constructors, work together with osteoclasts, the destructors, to tear down, renew, repair and replace the structural skeletal framework that supports our bodies. Interestingly, not all bone "moves" at the same speed. Trabecular bone, like that found in the hips, spine and wrist, is the softer and weaker interior bone tissue and renews at about 20% per year. Cortical bone, the stronger, harder exterior bone renews at about 4% each year.

When all is working well and there is a perfect balance between construction and destruction, our bones remain healthy and strong throughout our lives. But, if bone destruction is faster than construction then bone density drops and osteoporosis occurs.

Calcium and magnesium are the "king-pin" nutrients of bone health. When not present in the diet daily in adequate amounts, bone destruction can occur, but construction will cease. Both working together in synergy, are critically important every day in order to keep the high intensity biodynamics of our bones in balance to experience life-long health and the prevention of osteoporosis.

LOOKING BEYOND BONE HEALTH

Though calcium, magnesium and vitamin-D are essential synergistic partners in the development and maintenance of lifelong bone health, they each play other critical roles in the body as well. Here's a quick look at some of the latest findings for these three nutritional powerhouses.

CALCIUM

Though most people will only associate calcium in the diet with bone health, scientists and medical professionals know it is critical for much more than that.

- **Muscle Contraction:** When calcium is not present in sufficient quantities in the body muscle cramping can become frequent. The connection is so well established that taking calcium supplement before bed time is a common and effect way to prevent most nighttime muscle cramping.
- **Cardiovascular Health:** One of the most important signs of cardiovascular health is the ability of our blood vessels to expand and contract in sync with heart rate, blood pressure and blood flow needs. Calcium is known to play a direct role vascular structure and exert influence of blood flow and pressure.[4]
- **And More...** Calcium is also essential for such other critical body functions as the secretion of hormones and enzymes, and transmitting impulses throughout the nervous system.

DID YOU KNOW?

- How efficient we are at absorbing calcium changes with age. The older we get the less efficient we are. Absorption is as high as 60% in infants and young children, who need substantial amounts of the mineral to build bone. Absorption decreases to 15%-20% in adulthood and continues to decrease as people age; this explains the higher recommended calcium intakes for age's >51 years.

CALCIUM INTAKE RECOMMENDATIONS				
Age	Male	Female	Deficiency Females [5]	Deficiency Males [6]
Birth to 6 months	210 mg	210mg		
7-12 months	270mg	270mg		
1-3 years	500mg	500mg		
4-8 years	800mg	800mg	58%	44%
9-13 years	1,300mg	1,300mg		
14-18 years	1,300mg	1,300mg*	64%	87%
19-50 years	1,000mg	1,000mg*	78%	55%
50+ years	1,200mg	1,200mg*	Avg. intake; 797mg[6]	Avg. intake 660mg[7]

*Intake recommendations for women who are also pregnant or lactating. (Data based on American research)

MAGNESIUM

Research continues to validate the importance of magnesium to multiple biochemical and physiological functions in the body.

DID YOU KNOW?

- Magnesium is the 4th most abundant mineral in the body. Approximately 50% of it is found in our bones.

• **Heart Health:** One of the more serious signs of magnesium deficiency is abnormal heart rhythms which can lead to the potential for coronary spasms.[7] In addition, a December 2009 study published in the Journal of the American Academy of Nurse Practitioners concluded that "oral magnesium supplementation is recommended" for men suffering from or are at risk of heart disease and for people who are not sure their diet is providing enough.[8]

• **Blood Pressure:** Epidemiologic evidence suggests that magnesium may play an important role in regulating blood pressure.[9] One study that spanned 6 years found that the risk of developing hypertension in women decreased as dietary magnesium intake increased.[10] In fact, the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure recommends that diets providing plenty of magnesium are positive lifestyle modifications for individuals with hypertension.

• **Diabetes:** Magnesium plays an important role in carbohydrate metabolism. It may influence the release and activity of insulin, the hormone that helps control blood glucose (sugar) levels. Low blood levels of magnesium (hypomagnesemia) are frequently seen in individuals with type-2 diabetes.[11] More recent data from a 2007 meta-analysis (combined review of several studies) suggested that 100 mg of magnesium was equated to a 15% reduction in risk for type-2 diabetes.[12]

• **Healthy Colon:** Researchers from the School of Public Health at the University of Minnesota found that in 35,196 women with an average age of 61, the relative risk of colon cancer was 25 per cent lower in those with the highest intakes of magnesium (more than 356 mg per day).[13]

MAGNESIUM INTAKE RECOMMENDATIONS

Age	Male	Female	Pregnant Women
1-3 years	80mg	80mg	
4-8 years	130mg	130mg	
9-13 years	240mg	240mg	
14-18 years	410mg	360mg	400mg Lactating 360mg
19-30 years	400mg	310mg	350mg Lactating 310mg
31+ years	420mg	320mg	360mg Lactating 320mg

(Data based on American Research)

VITAMIN D

- In addition to calcium and magnesium, emerging science is supporting vitamin-D as another important nutrient in bone health. Vitamin-D has been shown to promote the absorption of calcium and work synergistically with calcium to help reduce the risk of bone fractures in adults as well as the risk of osteoporosis.[14]
- Recent studies show that vitamin-D malnutrition can also be associated with an increased susceptibility to several chronic diseases, such as high blood pressure, tuberculosis, cancer, periodontal disease, multiple sclerosis, chronic pain, seasonal affective disorder,[16] peripheral artery disease,[17] cognitive impairment, [18] and several autoimmune diseases[19] including type 1 diabetes.
- Because of the health benefits associated with vitamin-D, it is important to get enough of this nutrient. Sunlight is a primary source of vitamin-D, but for those concerned about lengthy exposure to sunlight, vitamin-D rich foods or dietary supplements are other suitable alternatives to meet their vitamin-D needs.*

*Current vitamin D recommendations are being investigated and reviewed around the world. Many researches propose 1000IU as the recommended daily intake level.

REFERENCES

1. Shils ME. Magnesium. In Modern Nutrition in Health and Disease, 9th Edition. New York: Lippincott Williams and Wilkins, 1999; 169-92.
2. Ryder KM,et al.Magnesium intake from food and supplements is associated with bone mineral density in healthy older white subjects. J Am Geriatr Soc. 2005 Nov;53(11):1875-80.
3. Carpenter TO, et al. A randomized controlled study of effects of dietary magnesium oxide supplementation on bone mineral content in healthy girls. J Clin Endocrinol Metab. 2006 Dec;91(12):4866-72.
4. Dickinson HO, et al. Calcium supplementation for the management of primary hypertension in adults. Cochrane Database Syst Rev. 2006 Apr 19;(2):CD004639.
5. Results from the United States Department of Agriculture's 1994-96 Continuing Survey of Food Intakes by Individuals/Diet and Health Knowledge Survey, U.S.
6. Ervin RB, et al. Dietary intake of selected minerals for the United States population: 1999-2000. Adv Data. 2004 Apr 27;(341):1-5.
7. Saris NE, et al. Magnesium. An update on physiological, clinical and analytical aspects. Clin Chim Acta. 2000 Apr;294(1-2):1-26.
8. Mathers TW, et al. Oral magnesium supplementation in adults with coronary heart disease or coronary heart disease risk. J Am Acad Nurs Pract. 2009 Dec; 21(12):651-7
9. Institute of Medicine. Food and Nutrition Board. Dietary Reference Intakes: Calcium, Phosphorus, Magnesium, Vitamin D and Fluoride. National Academy Press. Washington, DC, 1999
10. Peacock JM, et al. Relationship of serum and dietary magnesium to incident hypertension: the Atherosclerosis Risk in Communities (ARIC) Study. Annals of Epidemiology 1999;9:159-65.
11. Tosiello L, et al. Hypomagnesemia and diabetes mellitus. A review of clinical implications. Arch Intern Med 1996;156:1143-8.
12. Larsson SC, Wolk A. Magnesium intake and risk of type 2 diabetes: a meta-analysis. J Intern Med. 2007 Aug;262(2):208-14.
13. Steinmetz KA, et al. Vegetables, Fruit, and Colon Cancer in the Iowa Women's Health Study. Am J Epid. 1994; 163: 232-235
14. Reid IR. The roles of calcium and vitamin D in the prevention of osteoporosis. Endocrinol Metab Clin North Am 1998;27:389-98.
15. Straube S, et al. Vitamin D and chronic pain. Pain. 2009 Jan;141(1-2):10-3. Epub 2008 Dec 11.
16. "Vitamin D" - Evidence-based monograph. Mayo Clinic. Natural Standard Research Collaboration (2008-03-01). November 2008
17. Melamed ML, et al. Serum 25-Hydroxyvitamin D Levels and the Prevalence of Peripheral Arterial Disease. Results from NHANES 2001 to 2004. Arterioscler. Thromb. Vasc. Biol. 2008; 28 (6): 1179
18. Llewellyn DJ, et al. Serum 25-Hydroxyvitamin D Concentration and Cognitive Impairment. J Geriatr Psychiatry Neurol. 2009 Feb; 22 (3): 188-95.
19. Holick MF. Sunlight and vitamin D for bone health and prevention of autoimmune diseases, cancers, and cardiovascular disease. Am J Clin Nutr. 2004 Dec;80(6 Suppl):1678S-88S.