



“Integrating the Nutrition-Health connection”

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### **Balanced Bone Health**

Calcium is essential to bone health, however, it is extremely important not to overlook the other vital nutrients which synergistically promote the maintenance of healthy bone tissue. For instance, megadoses of calcium, in the absence of other minerals such as magnesium, may contribute to abnormal soft tissue calcification. Recent research is showing that magnesium is at least as important as calcium in preventing osteoporosis. Oral supplementation with as much magnesium as calcium helps to prevent bone loss and increase the re-mineralization of weight-bearing, trabecular bone in post-menopausal osteoporotic women (Makgoba NW Datta HK. Eur J Clin Invest. 1992;22:692-696; Abraham GE Grewal H. A total dietary program emphasizing magnesium instead of calcium. J Repro Med. 1990;35:503-507). (Calcium supplementation mostly increases the mineral density of non-weight bearing, cortical bone). Magnesium deficiency is common in patients with osteoporosis (Werbach MR, Nutritional Influences on Illness 1987. Keats Publ. New Canaan, Conn., p. 339; Cohen, L Kitzes R. Israel J Med Sci 1981;17:1123-1125).

This idea of synergistic bone nutrition is reiterated with reports of possible adverse effects from supplementing ONLY calcium in celiac patients, which, “may have exacerbated marginal deficiencies of magnesium, zinc, manganese, or other minerals that are needed to maintain bone mass”, since celiac patients have decreased absorption and have multiple nutritional deficiencies (Mautalen C. et al. Am J Gastroenterol 1997;92:313-318). As a supplement choice, veal bone meal is approximately 55% magnesium, and includes trace minerals such as zinc and manganese. How convenient that nature provides such a balanced supply of nutrients for bone health!

Phytoestrogens (plant phytochemicals that demonstrate weak estrogenic activity), can contribute to proper bone growth and maintenance. “Phytoestrogens are potentially important in the prevention of postmenopausal osteoporosis caused by estrogen deficiency” (Draper C et al. J of Nutr 1997;127:1795-1799). Phytoestrogens can increase estrogen when levels are low, and also prevent exceedingly high levels by occupying estrogen receptors. Phytoestrogens are found in high quantities in soy (of all foods, tofu contains the greatest amounts of isoflavones), and in the herbs dong quai and black cohosh (black cohosh is contraindicated in pregnancy). The isoflavones may have a direct effect on bone health by inhibiting bone loss (Brandi ML Bone and Mineral 1992;19(Suppl):S3-S14). The herbs ginseng and horsetail can increase estrogen levels and are recommended for women at menopause (Ojeda, L. Menopause without medicine. Hunter House Inc. 1995). Wild yam does not contain progesterone, however it does contain diosgenin, which is a precursor to progesterone. While estrogen mainly prevents bone loss, or osteoclast activity, progesterone stimulates bone growth, or osteoblast activity (Lee J. MD. Natural Progesterone: The multiple roles of a remarkable hormone. BLL Publ. Sebastopol CA 1993).

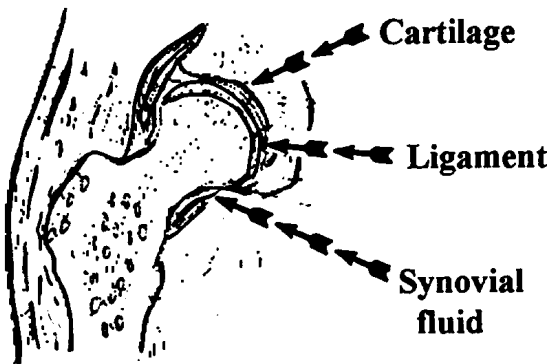
**“Calcium is essential for bone, joint, muscle and ligament health, while magnesium is necessary for calcium’s proper incorporation into bone, by preventing a buildup of calcium into the soft tissues and joints.... Most people, though, consume too much calcium and not enough magnesium” -**  
(Burton Goldberg Group, *Alternative Medicine: The Definitive Guide*, Future Medicine Publishing, Inc. WA, p. 533).

## ***Vitamin D Deficiency is Being Called, “The Silent Epidemic”***

The main function of Vitamin D is to maintain blood calcium in the normal range, largely by regulating intestinal absorption from the food we eat (Chandra, Ranjit Kumar, M.D., et al, Canadian Medical Association Journal, 1991;145:11:1475-1487). In a recent issue of Nutrition Action Healthletter (October, 1997, p. 3), Michael F. Holick, director of the Vitamin D, Skin and Bone research Laboratory at Boston University Medical Center, reports that there is a, “silent epidemic of vitamin D deficiency among older people”, with levels being especially low in wintertime (The sun converts a precursor to vitamin D by light absorption through the skin). Holick reports that lack of foods containing vitamin D, plus fear of skin cancer and wrinkles, are factors contributing to the silent epidemic. In Los Angeles, for example, vitamin D is made from sunlight year round, however, in Boston, the angle of the sun prevents vitamin D synthesis from November to February.

The elderly are also at risk because there seems to be a three to four fold drop in the precursor of vitamin D in the skin of people over the age 70, and when exposed to light, blood levels of vitamin D only increased one-third as much as younger study participants. Additionally, when milk, “supposedly high” in fortified vitamin D, was tested, “seven out of ten samples contained less than 80% of the amount of vitamin D that was listed on the label. Half didn’t even contain 50%, and 14% of the skim milk samples contained no detectable vitamin D (NEJM 1993;329:1507; and 1992;326:1178).

*“The only natural food sources are cod liver oil and some fatty fish, but unless you’re eating them two or three times a week, you’re not getting enough vitamin D... My belief is that people over the age of 50 need 400 to 600 IU a day, and that for people over 70 it could be as high as 800 IU” - Michael F. Holick.*



**A NORMAL JOINT** In a normal joint, the bones are lubricated at their junction by synovial fluid. Synovial fluid is secreted by the synovium, which is a thin membrane on the inside of the ligaments covering the joint. The ligaments (fibrous connective tissue), join the bones together. The ligaments, along with the synovial lining, encapsulate the joint and protect it.

## **OSTEOARTHRITIS**

In **osteoarthritis**, the disease begins with the degeneration of the cushion of cartilage between the joints. As it degrades, the synovium and the ends of the bones thicken, resulting in the pain and stiffness associated with arthritis. Osteoarthritis is the most common form of arthritis, affecting almost 16 million Americans, most of whom are over the age of 45. This degenerative disease primarily affects the large, weight bearing joints (including the knees, lower back, hips, neck and the feet) and the joints in the hands. The progressive cartilage deterioration is followed by “hardening of the joints” due to calcification and bone spur formation.

### Signs and Symptoms of Osteoarthritis:

- early morning joint stiffness and pain
- loss or restriction of joint mobility
- pain that is worse after use
- stiffness after periods of rest
- creaking/cracking of joints after movement (also known as crepitus)
- tenderness and swelling in certain areas
- restricted mobility
- pain in the joint before or during changes in the weather
- deformity of the joints



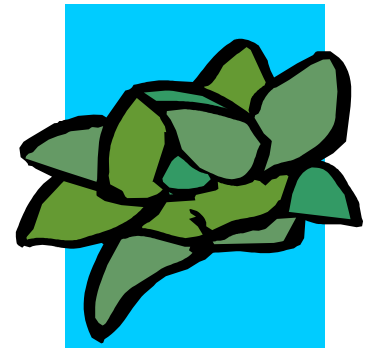
### Antioxidants and Osteoarthritis

Controlled trials have shown that 400-600 IU's of **vitamin E** can be helpful in the treatment of osteoarthritis (Blankenhom G. Z Orthop 1986;124:340-343; Machtey I, Ouaknine L. J Am Geriatr Soc 1978;25:328). Vitamin E at 600 mg/d has also been recommended by J. Pizzorno, ND, who notes its ability to inhibit the activities of the lysosomal enzymes and stimulate increased deposition of proteoglycan. (Pizzorno, Joseph E., Jr., ND, Alternative and Complementary Therapies, January/February 1995;93-95).

In a recent epidemiological study, Arthritis and Rheumatism reports that antioxidants are correlated to a drop in progression of osteoarthritis in the knees of 640 patients, independent of diet/food allergies (McAlindon TE et al., Arthrit Rheum 1996;39:648-656). **Vitamin C** had the highest correlation (70%), and it was associated with reduced cartilage loss, followed by **beta carotene** and **vitamin E**. Dr. Steve Austin observes that doctors of nutritional medicine almost universally prescribe **glucosamine sulfate** and **allergy elimination**, and that, "**antioxidants may soon be added to this list**" (Austin S. Clinical Nutrition Update (Summer 1996:p. 10).

### Dietary Help

**Detoxification, stress reduction, and proper diet** are all important. It's a good idea to increase complex carbohydrates, dietary fiber, fruits, vegetables and nuts. Increasing cold water fish for an **essential fatty acid source** (Omega-3) including salmon, mackerel, sardines and herring is a good idea. Avoid saturated fats and trans fatty acids. Follow a low-fat diet, but one that is proportionately rich in good fatty acids, such as the omega 3's mentioned above, and also gamma linolenic acid (found in black currant seed oil, borage oil and evening primrose oil). **Boron**-rich foods include alfalfa, lettuce, peas, cabbage, apples, dates, prunes, raisins, almonds and hazelnuts. "The Rheumatoid Disease Foundation suggests the use of boron to treat osteoarthritis, rheumatoid arthritis, and osteoporosis. Boron apparently plays a role in the retention of **calcium** and also positively stimulates hormonal factors for both men and women, contributing to healthy bones" (Burton Goldberg Group, Alternative Medicine: The Definitive Guide, Future Medicine Publishing, Inc. WA, p. 533). Since boron can raise estradiol levels, some premenopausal women with high amounts of circulating estrogen may not choose to supplement with boron. Sulfur and methionine-containing foods such as legumes, cabbage, brussel sprouts, garlic and onions are also beneficial (di Padova, C. S-adenosylmethionine in the treatment of osteoarthritis. Review of the clinical studies. Am J Med. 1987; 83(5A): 60-65). An elimination/rotation diet is recommended, since allergy foods are implicated in osteoarthritis. The most common offenders include dairy products, refined foods, meat, citrus fruits and nightshade foods (tomatoes, white potatoes, eggplant, and peppers) and margarine. The nightshade foods are alkaloids that can increase inflammation and inhibit collagen repair; they also contain a toxic substance called solanine that triggers reactions in people, and should be avoided. Caffeine, alcohol and tobacco are also no-no's. Regular chiropractic care is a good idea to address structural/postural problems and prevent arthritic tendencies.



## **High-Dose Glucosamine Sulfate vs Synergistic Nutrition**

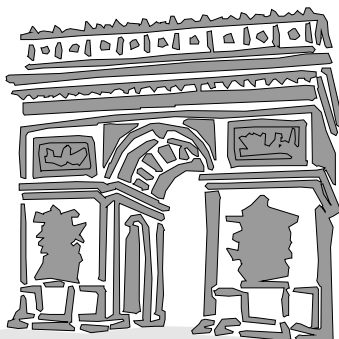
Is high-dose glucosamine sulfate the product of choice for joint pain/reconstruction? Not necessarily. **Glucosamine sulfate (GS)**, which has become popular due to its reported effects on soft tissue healing, is **helpful in osteoarthritis** (Drovanti, A. et al. Clin Ther. 1980; 3(4):260; Int J Tissue Reac. 1992;14(5):253-61), **but is not the only building block for healthy cartilage**. In fact, glucosamine is used as a precursor for another important building block, **N-acetyl glucosamine (NAG)**. Giving NAG directly not only **saves the body conversion energy**, it bypasses the acetylation step that is impaired in many disorders, including Inflammatory bowel disease, and is also impaired by alcohol and non-steroidal anti-inflammatory drugs. Additionally, many glycosaminoglycan patterns (bigger building blocks, of which NAG is an ingredient), are impaired in connective tissue diseases (Boll Soc Ital Biol Sper. 1992;68(12):741-7). Providing a synergistic nutrient profile assures sufficient building blocks for complete repair, eliminates the need for high dosing, and guards against mild side effects that are possible from high dosing, including: stomach upset, heartburn, diarrhea, nausea, and indigestion (Murray, M. Encyclopedia of Nutritional Supplements. Prima Publ. Rocklin, Ca. 1996). Glucosamine sulfate has an excellent safety record, and in fact, is considered the treatment of choice, “for prolonged oral treatment of rheumatic disorders” (Arzneimittelforschung. 1991 May; 41(5):542-5), however, even mild side effects are a signal that high-dosing is not the best approach. Joseph Pizzorno Jr., ND, cautions that glucosamine sulfate is not an analgesic and takes several weeks before symptomatic relief in osteoarthritis can be obtained. (Pizzorno, Joseph E., Jr., ND, Alternative and Complementary Therapies, January/February 1995;93-95). Many clinical trials have emphasized the therapeutic value of GS in degenerative joint disease such as osteoarthritis (Int J Tissue Reac. 1992;14(5):253-61; Drovanti, A. et al. Clin Ther. 1980; 3(4):260), noting that unlike drugs, which relieve pain but destroy cartilage, GS, “with its chondrometabolic, antireactive and antiarthritic properties, represents the pharmacological rationale for the use of GS as a disease-modifying agent in osteoarthritis” (Int J Tissue Reac. 1992;14(5):253-61).



*Synergistic nutrition ensures the proper building blocks for a good foundation*

As important as GS is to healthy cartilage, **N-acetyl glucosamine (NAG) is just as important to the extracellular matrix** that also helps to comprise our, “cellular cement”. NAG is needed for synthesis of the chondroitin proteoglycans (bigger building blocks) (Biochem J. 1991 Jan; 273(Pt 2): 283-88). When exogenous GS is given and some is converted to NAG, there are scientists who believe that it is the NAG, “which finally determines the antitoxic and antioxidative properties in this amino sugar” (Eksp Klin Farmakol. 1993. 56(5):53-5). NAG has the ability to reduce joint pain, swelling, and restricted motion by itself; in fact the Merck Index puts NAG in an **antiarthritic, therapeutic** category of its own (p 4353).

*Glucosamine sulfate is only one of the building blocks of healthy cartilage*



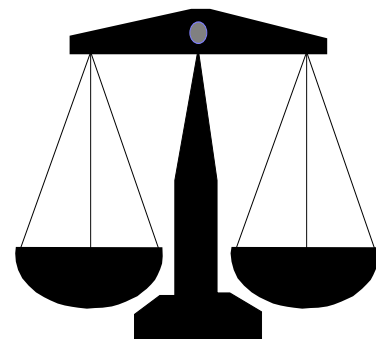
*NAG comprises part of the “cellular cement” around bone tissue that contributes to the “total structure” of connective tissue.*

## **Glucosamine Sulfate vs Synergistic Nutrition (Cont'd)**

N-acetyl glucosamine forms a web-like, highly viscous layer over the intestinal mucosa, which protects underlying tissues from bacterial and toxic assault. The effect NAG has on closing a “**leaky gut**” can go a long way in inhibiting the CAUSE of joint pain, i.e. preventing entry of microorganisms which aggravate and even inhabit joint tissue. There are several ways in which NAG is acting to eliminate the **origin** of joint problems:

- Decreasing bacterial growth by strengthening intestinal mucosa, promoting growth of bifidobacteria (Gauhe A. et al., Arch Biochem Biophys 1954;48:214), and reducing adherence of organisms such as Candida albicans and E. coli to the gut wall.
- Preventing cell damage (Int J Parasitol. 1991 Dec; 21(8):941-4).
- Inhibiting lectin interactions (lectins can cause inflammation and intestinal permeability) (Int J Parasitol. 1991 Dec; 21(8):941-4).
- Blocking the release of the leukocyte elastase enzyme (elastase is an enzyme which breaks down elastin connective tissue (Clin Exp Rheumatol. 1991 Jan-Feb; 9(1):17-21).
- Eliminating parasites (Int J Parasitol. 1991; 21(8):941-4).
- Acting as an helminthic (dewormer) (J Helminthol. 1993;67(3):179-88).
- Increasing protective mucous production (J Helminthol. 1993;67(3):179-88).
- Fighting inflammatory free radicals and lipid peroxidation (J Cell Biochem 1994 Oct; 56(2):225-35; Eksp Klin Farmakol. 1993. 56(5):53-5).

There is also the synergistic effect on other organs to consider. NAG has a strong effect on the liver, which detoxifies many of the substances which can aggravate/cause joint pain. NAG is instrumental in preventing liver peroxidation, and has been credited with contributing to the significant regression (up to 84%) of a patient’s liver tumor (Gan To Kagaku Ryoho. 1994 Sep; 21(13):2225-8). **Another accessory nutrient, N-acetyl cysteine (NAC)**, protects against cell death (Proc Nat Acad Sci 1994;91(16):7496-500). , and is noted by Life Sciences as a “reference compound” for, “inhibition of liver injury and lipid peroxidation” (Life Sci 1994;55(8):PL145-50). **Silymarin and milk thistle** support the cleansing activities of the liver. **Glutathione** is an antioxidant, and also the major conjugating agent in the liver which pulls toxins out of the body. **Cysteine, glycine, taurine, and glutamic acid** all contribute to efficient removal of toxins from the liver. **Soluble trachea** is a natural source of chondroitin sulfate, and **green-lipped mussel** is not only a natural source of mucopolysaccharides (bigger building blocks), it is a natural source of superoxide dismutase (the enzyme that scavenges the inflammatory superoxide radical), and was shown to be beneficial for severe osteoarthritis patients who did not respond to medication. (Werbach, M., M.D., Healing Through Nutrition, Harper Collins Publishers, NY, p. 286). **Pantothenic acid** is a nutrient that supports the adrenal glands, which produce natural, antiinflammatory corticosteroids such as cortisol.



*Synergistic nutrition  
contributes to a  
balanced approach*

*All in all, it appears that encompassing a synergistic and holistic attitude (get to the cause and not just the symptoms) requires a balanced nutritional approach.*

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