NUTRI NEWS

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Nutritional Advances: Menopause and Osteoporosis

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Researchers at the Mayo Clinic recently concluded that, "Osteoporosis is the most common bone disorder encountered in clinical practice. It is also one of the most important diseases facing our aging population." Ironically, Osteoporosis is primarily a disease of "modernized" or developed countries unlike other diseases which affect countries with less advanced technologies. In women, bone loss accelerates after menopause. This may be due in part to what is called "estrogen dominance" – an effect of the abundant use of hormones and chemicals in our foods and environment.

Bone cells, like all cells in the body, are continually renewing themselves. Discrete cell types, anatomically and functionally connected, are continually renewed and maintain the complex skeletal tissue. Within bone, specific cells are responsible for the creation (osteoblasts) and destruction (osteoclasts) of bone tissue. Complex cellular, physiologic and metabolic factors control the balance between bone formation and destruction. Changes in the dynamic between formation and destruction (often called resorption) underlie the development of osteoporosis. Several systemic hormones and a number of additional factors regulate bone cell activity. In osteoporosis, as in hypertension, there is often a long latent period before clinical symptoms or complications develop.

Clinical Signs and Symptoms:

Osteoporosis is a skeletal condition characterized by decreased density (mass/volume) of normally mineralized bone. Not only does the reduced bone density lead to decreased mechanical strength, but the skeleton is prone to fracture. Next to age-related osteoporosis (Type II), postmenopausal osteoporosis (Type I) is the most common primary form of bone loss seen in clinical practice. Often an episode of acute back pain occurring when a person is at rest or during such routine activity as bending, standing from a seated position, lifting a heavy object or opening a window can signify problems in this area.

In conventional medicine, the mainstays of prevention and management of osteoporosis are estrogen and calcium. Estrogens affect bone development by influencing osteoclast activity. They prevent rapid bone resorption which helps to slow the rate of bone loss. However, there is no evidence showing that estrogens actually increase bone formation. If estrogen supplementation stops, bone loss resumes, possibly at an accelerated rate. In Dr. Alan Gaby's book, "Preventing and Reversing Osteoporosis", he states that in order for estrogen therapy to prevent osteoporosis, it must begin before significant bone loss has occurred and must continue indefinitely. In addition to the proactive therapies prescribed by doctors, he emphasizes nutrition as a key aspect. Women are urged to treat and prevent osteoporosis through essential nutritional guidelines.

Getting the right dose: Is the RDA on Calcium Supplementation too low?

In 1984 the National Institute for Health convened an international meeting on Osteoporosis. The suggestion by the NIH conference panel was that calcium intake in the range of 1200 to 1500 mg/day might result in higher peak adult bone mass. The usual daily intake of elemental calcium in the United States, 450-550 mg, falls well below the National Research Council's (NRC) recommended dietary allowance (RDA) of 1000 mg; the RDA is designed to meet the needs of approximately 95% or more of the population and menopausal females are not included in this figure. According to the calcium metabolic balance studies, 1,000 mg of calcium

is indicated for premenopausal and estrogen-treated women. Postmenopausal women who are not treated with estrogen require about 1,500 mg daily for calcium balance. The RDA for calcium is criticized for being extremely low**, particularly for postmenopausal women, not to mention the elderly. Clinical trial data and reanalysis of calcium balance studies have provided the momentum for considering the upward revision of recommended calcium intakes for adolescents.

Bone health is a reflection of total health

In the past five years, there has been a growing appreciation that low bone mineral density is *not* exclusively a calcium-deficiency disease. Calcium intake is only one of the many factors that affect bone mineral density. Others include hormonal status, age, weight, physical activity, and efficiency of calcium absorption. Exercise and nutrition are recognized as important adjuncts as well.

Diet, as well as intestinal and renal function will influence mineral ion homeostasis needed to maintain the skeleton. The coupling of bone formation and resorption are also modified by external physical forces such as those generated by body weight and exercise. Changes in the acid-base balance of the body is a tremendous contributor to bone loss. Improving the breakdown, digestion and assimilation of nutrients is critical to calcium absorption. Therefore, calcium deficiency is only one of *many* contributing factors to osteoporosis; a better description of osteoporosis would perhaps be a *mineral imbalance*.

Nutritional Advances in Osteoporosis

The role of nutrition, particularly calcium nutrition, in the mineralization of bone in adolescents and preadolescents has been minimally investigated for the past 20 years; recently, however, that trend has been reversed. Researchers from Belgium concluded "none of the currently available medications for osteoporosis have demonstrated the ability to fully prevent the occurrence of the new vertebral or peripheral osteoporotic fracture once the disease is established."

Patients should also know that simply increasing calcium intake does not guarantee strong bones. Inefficient calcium absorption can be a problem. A study published in The New England Journal of Medicine showed that almost half (40%) of the postmenopausal women cannot absorb calcium carbonate (for example, TUMS, Rolaids) well. The absorption rate is a mere 4%! The reason for this is their stomachs do not have enough hydrochloric acid to dissolve the calcium carbonate.

**Levels of calcium intake greater than those recommended herein could cause urinary tract stones in susceptible people. Therefore, anyone with a history of kidney stones should only undertake calcium supplementation with the guidance of a physician.

No nutrient functions in isolation. Healthy bone nutrients include vitamin D, magnesium, and vitamin K. It is essential to supplement these nutrients with calcium for optimal benefits. Vitamin D is crucial because it is so intimately involved in the absorption of calcium. Other nutrients which also may contribute to bone health include, vitamin B-12, B-6, C, D, E, copper, phosphorus, silica, boron, and DHEA.

Another "bone nutrient" which is of great interest to bone specialists today is MCHC. MCHC (Microcrystalline hydroxyapatite calcium) is an extract from whole bone. It contains a complex of important trace elements/components found in bone including calcium, phosphorus and magnesium. What makes MCHC so unique is that the minerals in the complex naturally occur in the proper ratio that they actually exist in bone. It also features a lattice shaped, crystalline structure which surrounds proteins such as collagen- the vital connective tissue holding us together.

As per David Hoffman, Herbalist, herbal and nutritional treatments cannot eliminate osteoporosis but it can slow down the process. Nutrient rich botanicals such as *Medicago sativa* (alfalfa), *Urtica dioica* (nettles) and *Equisetum arvense* (horsetail) can be taken for long term treatment of osteoporosis. A time tested herbal combination used to facilitate the uptake of calcium salt and to fortify broken bones combines the mineral ash of alfalfa leaf, nettle leaf, concentrated extract of sea vegetation and marine algae (specifically kelp and bladderwrack).

- Horsetail contains the essential trace mineral, silica, which is vital to proper formation and repair of bone, cartilage, skin and connective tissues of all kinds.
- Silica is an integral part of collagen and the protein complexes. It is crucial to the formation of bones and cartilage matrices.
- Alfalfa contains phytoestrogens and its action is to restore the strength and tone of the digestive, ovarian and uterine tissue. It is one of the most potent vitamin-containing herbs known and is very high in mineral protein, phosphorus, iron, potassium, chlorine, sodium, silicon, and magnesium. It also contains minute quantities of trace elements. The isoflavones in alfalfa are estrogenic. Calcium, phosphorus and iron work in harmony to strengthen the bones. The reason alfalfa is so rich in all these nutrients is because in its early stages of growth, the young roots have been known to penetrate as far down as 50 to 66 feet, with an average depth of 38 feet. Because these roots go down so far, they are able to mine out the

precious resources located in the sub-strata levels of the earth far beneath. The real secret of alfalfa lays in eight digestive enzymes that permit the stomach to process food better, thereby allowing greater nutritional assimilation.

For women in menopause, phytoestrogens offer valuable adjunctive therapy to support the female reproductive tract. Most of the identified phytoestrogen constituents consist of sterols, coumestans and isoflavones. Coumestans have a high affinity for the human estrogen receptor and are 30 times more potent than isoflavones. Phytoestrogens compete with estradiol for estrogen binding sites in the reproductive tracts of animals in vivo and in human breast cancer cells in vitro. The most potent phytoestrogens are phytosterols. Common foods which contain phytosterols are sesame, soy, chestnuts, pumpkin and sunflower seeds. They are most common in whole grains, nuts, seeds and legumes. Plant oils are also high in phytosterols.

Cimicifuga (Black Cohosh) is invaluable in many aspects of the female hormonal balance of estrogens and osteoporosis. It has been shown to suppress leutinizing hormone surges associated with menopausal hot flashes. Research has also shown that Black Cohosh has an inhibitory activity in vitro and in vivo on bone resorption in ovariectomized rats as well as rats on low calcium diets. It is specific for headaches in the late luteal phase which are associated with lower estrogen levels. Its constituents compete in vitro with 17-betaestradiol for estrogen receptor binding sites. Numerous other plants including wild yam, licorice, False Unicorn root, and ginseng have also been shown to be effective at relieving the symptoms of menopause.

The Isoflavones, Ipriflavone and SERMs

Are all estrogens created the same? What is a phytoestrogen? There are over 300 species of plants that have some degree of demonstrable estrogen activity. A phytoestrogen (plant estrogen) binds to estrogen receptors and elicits a cellular response. This response is of lesser amplitude than estrogen due to the fact that the phytoestrogen binds to the estrogen receptor for a shorter duration of time than does the endogenous hormone. The development of a recent term, SERMs (selective estrogen receptor modulators) concerns itself with just this type of question. SERMs are compounds (such as tamoxifen and raloxifene) that act like estrogen on some levels, but do not adversely affect breast and uterine tissue. *So depending upon the tissue in question,* estrogenic or anti-estrogenic effects can be elucidated. Some experts consider isoflavones (from soybeans) as natural SERMs. There is no question that phytoestrogens, such as isoflavones, are not the same biochemically as the conjugated equine estrogens. Independent studies have shown that the isoflavones genistein and daidzein inhibited the growth of tumors in breast cancer cells. However, more research is needed before we can accurately characterize the effects of isoflavones.

Ipriflavone: The Best of Both Worlds

Ipriflavone, (IP) is a slightly modified, synthetic derivative of naturally occurring isoflavones, and is a well researched and effective supplement. Since the mid to late 1980s, ipriflavone has been an approved therapeutic agent for the prevention and treatment of osteoporosis in Europe and Japan. As of 1989, it has been approved for this purpose in 21 countries. In the United States it is available over-the-counter as a dietary supplement.

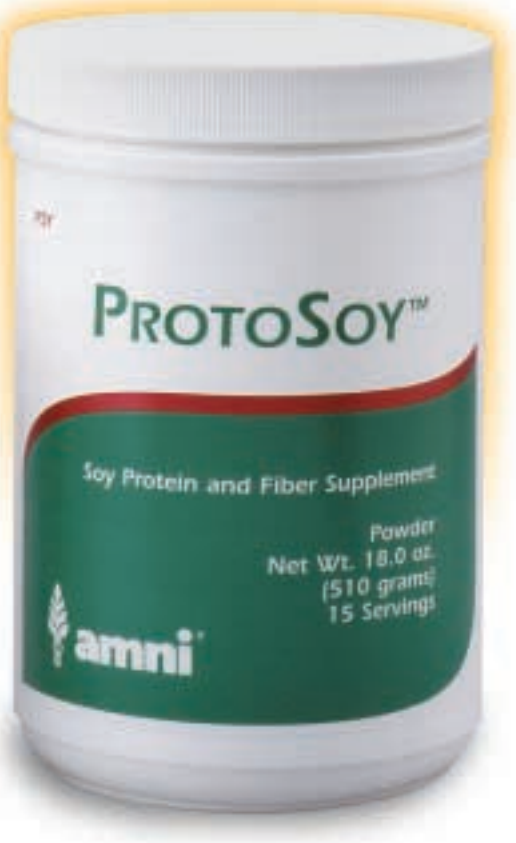
Several published studies have demonstrated that IP can prevent bone loss in postmenopausal women with low bone mass. Gambacciani and colleagues concluded that the standard dose of IP (600 mg per day) had the *same positive effect on bone turnover* as using IP with a lower dose of conjugated estrogen (0.3 mg/day).

Results of the Ipriflavone Multicenter European Fracture Study (IMEFS) are expected to be released soon. A total of 460 women from four European centers were recruited for this randomized, double-blind, placebo-controlled, parallel-group, three-year study assessing the effect of ipriflavone on fracture rates.

Currently, Douglas Laboratories is conducting a clinical trial on an ipriflavone-containing supplement. Postmenopausal women who are not currently receiving hormone replacement therapy were randomized to receive either a product containing ipriflavone and calcium, or a placebo for three months. A specific marker in the urine that indicates the amount of bone breakdown taking place (NTx, see below) will be measured before and after supplementation. Changes in this marker of bone breakdown will help to give further insight as to the usefulness of ipriflavone. Results from this study should be available in the spring.

What tests are effective in assessing BMD (bone mass density)?

The Achilles (DXA bone scan) measures baseline bone density using an ultrasonometer resonance scan. It gives the physician a fixed picture of bone density at a place in time when the test is performed. Bone density is a completely dynamic process,



and bone formation/ resorption is a constantly shifting process within the body. A good marker to measure this dynamic process is the Type I collagen which accounts for more than 90% of the organic matrix of bone. Type I collagen is synthesized primarily in the bone. During renewal of the skeleton, Type I collagen is degraded, and small peptide fragments are excreted into the bloodstream, and following renal excretion, into the urine.

The newer N-Telopeptide test (often referred to as NTx in the literature) measures the degradation products from the N-terminal telopeptide region of type I collagen, thus providing a more dynamic measurement of bone turnover. Many physicians will use these two tests in combination to monitor the success of their proactive patient therapies.

Sardines, Anchovies and Caviar – BON APPETITE!

Diet is an equally important factor in bone health. There are myriad nutritious foods that provide "bone nutrients." Contrary to the popularity that today's popular high protein diets are amazing, a diet which is high in protein can in fact induce a calcium deficiency. Fish, however, are very beneficial for bone health. Anchovies, caviar, herring, salmon (especially Pacific) are very high in usable calcium. Scallops and shrimp also contain calcium. So if you like fish, eat more. Sesame seeds (grind them up), almonds, hazelnuts, peanuts, pistachios, soy beans (and tofu), black beans, kidney beans, garbanzo beans, pinto beans, blackstrap molasses and many fruits (blackberries, currents, figs, goose berries, grapefruit, oranges, guava, papaya, rhubarb, etc.) are also excellent sources of calcium.

Nutritional studies have continued to be an important element in advancing our understanding of the causes and prevention of metabolic bone disease and osteoporosis.

Research efforts focusing on prevention, diagnosis, and treatment of osteoporosis are in progress and should provide improved strategies in the future. Halting the progress of osteoporosis *before* irreversible structural defects occur is key.

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