

BOOK REVIEW

Better Bones, Better Body

by Susan Brown, Ph.D.

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Having written this newsletter for approximately 10 years, it is interesting to occasionally look back at previous issues. As I do so, my reactions are varied. In general, I find that I am, even today, satisfied with many of the newsletters. I feel that they have held up well and, even in this time of rapid change and advancement in the field of clinical nutrition, have some clinical relevance. Others, even though I was happy with them at the time they were written, now seem terribly dated and either overly simplistic or contrary to current knowledge. However, there is one five part series of newsletters I wrote in 1991 which I remember quite clearly in a different, negative sort of way. For five months, from January through May of 1991, I wrote about research on osteoporosis and bone metabolism. Of course, you would think, having occupied all of that time plus 20 pages of copy, I would have come up with some high quality, clinically relevant observations. Much to my chagrin, I found, in this case, that the dictum, "truth and simplicity go hand-in-hand," was certainly applicable. I remember, after five months of writing and pouring through as much research on bone metabolism as I could find, that my overriding feeling was that I had authored a confusing mish-mash of data and contradictory observations that seemed to have no real significance, either scientifically or clinically. As I look back on those newsletters, my initial observation has certainly not changed. I find these newsletters just as confusing today as I did back then.

However, what I came to realize was that I was only partly at fault for what I had written. Certainly a portion of the problem was my lack of an overall understanding concerning the significance of the literature I had reviewed. However, what I also discovered, much to my relief, was that I was not alone in my confusion. At that time, many in both conventional medical and clinical nutrition circles were very uncertain about what osteoporosis is, what are its causes, and what to do about it. Because of my own confusion and the apparent confusion of those around me concerning this issue, I had opted not to write about osteoporosis since that time. Now, much to my delight, I have a reason to change this stance.

Several months ago I was introduced to *Better Bones, Better Body* by the book's author, Susan Brown Ph.D., whom I had known previously for quite some time. Of course, my first thought, given the title, was that this was another lightweight volume of fluff written for health food store fanatics. However, after reading the book, I found that I could not have been more wrong. Dr. Brown has, in my opinion, created a truly amazing piece of work. For, using information she has gained from twelve years of clinical and scientific research, she has taken the very complicated entity known as osteoporosis and explained what it is and how to manage it in a straight-forward, easy to understand manner. Keep in mind, though, that my saying "straight-forward and easy to understand" in no way infers simplistic. This book is immaculately and precisely referenced so that even the most hardened scientist should be impressed. Thus, Dr. Brown has accomplished a rare, admirable feat. She has created a volume that can easily be utilized by virtually any patient, yet is so well grounded concerning the most current scientific research that it can be an integral part of any health care professional's educational library.

What I would like to do in the remainder of this newsletter is present to you an extended summary of the major points in this excellent text. Dr. Brown begins by stating her overall position on osteoporosis from which she builds in later chapters:

"I now know that it is to some degree reversible, even though science has not yet determined the extent of this reversal potential. Moreover it is clear that the natural lowering of estrogen levels at menopause is not the cause of osteoporosis, and that we have seriously misunderstood the menopause-osteoporosis link. Several dangerous implications, in fact, flow from this faulty assumption. Nor does the answer simply concern low calcium intakes. I also now know that we have failed in our attempts to halt or prevent, much less reverse, osteoporosis because we do not adequately understand the true nature and causes of this disorder. Hard as we may try, we cannot build a strong and effective program to eliminate a disease which we do not truly understand."

Another key point made in her introductory foundation chapter is the following:

"Among other things I will demonstrate that osteoporosis is not something that "goes wrong" with our body, but rather it is a useful, actually essential, survival mechanism on the part of an infinitely intelligent body."

With this concept in mind, how does the "Better Bones, Better Body" program work? Dr. Brown states:

“The program is fully life supporting. This means that every aspect of our osteoporosis program is good not only for bone, but also good for the entire body. It is a program capable of building vastly better bones, a better body and better overall health.”

As you know from previous newsletters, I feel that probably the biggest mistake made by most health care practitioners, whether they be conventional or alternative, is that they approach chronically ill patients in a fragmented manner, employing the “Let’s try this and, if that doesn’t work, we’ll try that” approach to health care. As I have pointed out, treating all aspects of these patients’ health, which would include biochemical, physiological, emotional, and spiritual aspects, in a coordinated, knowledgeable manner, is absolutely vital. As Dr. Brown suggests, osteoporosis patients would certainly fit into this realm. Before, I move on to the crux of *Better Bones, Better Body*, I would like to discuss one other important point in Dr. Brown’s position statement. Recall, last month, my emphasis of the idea that we not continue to dwell in the familiar pro-nutrition, anti-drug rut. While Dr. Brown is not the least bit hesitant to discuss the many dangers of hormonal therapy for osteoporosis, she appears, to me, to be keeping this controversial issue in a healthy perspective:

“It is also important to note that while the Better Bones, Better Body Program is a proposal for us as a culture to go beyond estrogen drug therapy for osteoporosis, estrogen therapy is still important to millions of individual women for various reasons. For those women, incorporation of The Better Bones, Better Body Program will enhance the benefits of estrogen therapy.”

Part One: Rethinking the Nature of Osteoporosis

In the first chapter of this section, Dr. Brown gives an excellent review of the many intertwined facets of bone metabolism. Even though you may have studied this information during various, basic science lectures, I think you will find this chapter to be an excellent review which I strongly encourage you to read. In chapter two there are several interesting observations concerning the nature of osteoporosis which I would like to share with you. First, consider this important point:

“Bone does not fracture due to thinness alone; that is, osteoporosis by itself does not cause bone fractures. This is documented simply by the fact that half of the people with thin osteoporotic bones, in fact, never fracture.”

Dr. Brown then elaborates:

“...scientists report that an osteoporotic vertebra with only 50 percent of its normal amount of bone (which would be severe osteoporosis) is strong enough architecturally to withstand five times the strain load it would normally be given. And as they report, ‘Were the bone otherwise normal, it should not fracture.’”

Furthermore:

“Bones that fracture are not only osteoporotic, but they also lack the ability to repair themselves properly from the microfractures that regularly occur due to normal stress and strain. Thus, bone which fractures isn’t only thin, but also of poor quality with diminished self-repair capabilities.”

What factors contribute to this loss of self-repair capability? Generally, they are the same actors that have been discussed repeatedly in this forum over the last few months. They include nutritional inadequacy, chemical and metal toxicity, drugs, radiation, and lack of exercise. Osteoporosis can also be a secondary phenomenon due to endocrine diseases such as diabetes mellitus and hyper- and hypothyroidism, bone marrow disorders such as leukemia, connective tissue disorders, renal disease, liver disorders, and gastrointestinal disease. Whatever the cause, though, the key point being made by Dr. Brown is that osteoporotic fractures are caused by the loss of bone’s natural self-repair capacity, not normal loss of bone due to aging.

Another concern that Dr. Brown addresses is the reason why females, in this country, seem to suffer more from osteoporosis than men. After reviewing the literature, she found that social and cultural factors are primarily responsible, not genetics. These factors include (1) Excessive dieting which leads to undernutrition of both micro- and macronutrients, (2) lack of exercise, and (3) more surgical procedures. **“One-quarter of all surgical procedures performed in the United States hospitals are on female reproductive organs, induced abortions excluded.”**

Given the above, what exactly is osteoporosis? Dr. Brown proposes, very innovatively, that it may be an adaptive response. The author states:

“...osteoporosis begins as a very positive survival strategy, a strategy which draws minerals from the bones into the blood so that the body can continue to survive under less than ideal circumstances.”

Part Two: Rethinking the Causes of Osteoporosis

In this section, Dr. Brown elaborates on many of the causes of osteoporosis mentioned above. First, the important and highly controversial issue of calcium intake is addressed. After undertaking an extensive review of the literature, Dr. Brown concludes:

“Calcium is important to bone health, but osteoporosis cannot be reduced to low calcium intake either here or abroad.”

Furthermore, the daily intake needed to maintain positive calcium balance varies tremendously from country to country. Why is this? Dr. Brown notes:

“The adequate level for any given population...varies based on a number of other coexisting factors. These include intake of other bone building nutrients, consumption of potentially bone damaging substances like excess protein, salt, fat and sugar; the use of some drugs, alcohol, and tobacco; the level of physical activity; exposure to sunlight; environmental toxins and stress; ovary and uterus removal; and many other factors that limit endocrine gland functioning.”

Another important point that Dr. Brown makes is that menopause *per se* does not cause osteoporosis. If it did, women all over the world would develop this condition. Epidemiologic research clearly demonstrates that this is not the case. In fact, a leading researcher in osteoporosis, Dr. Robert Heaney, hypothesizes that:

“...only 10 to 15 percent of women’s skeletal mass is affected by estrogen.”

Because nutrition is the primary focus of this newsletter, I would now like highlight some of the key points from Dr. Brown’s excellent discussion on the nutrients that are necessary for bone health.

1. Calcium - Daily intake should range from 400 mg for young infants to 1500 mg for postmenopausal women and all individuals over 65 years of age. Intake need will vary based on the factors mentioned above.
2. Phosphorus - Most Americans have excessive intake of this nutrient due to high ingestion of meats, soft drinks, processed foods such as baked goods, and cheeses to which phosphorus compounds have been added.
3. Magnesium - Both intake and body stores of this nutrient, which participates in numerous key metabolic pathways, are deficient in a large majority of the American population. One important reason for depleted body stores has to do with our nation’s obsession with calcium:

“Increasing calcium supplementation without increasing magnesium supplementation can actually increase magnesium losses.”

Current recommended intake is as high as 450 mg per day for adults.

4. Fluoride - While this nutrient is essential for proper bone health, excessive intake can weaken bones and increase risk of fractures. Estimated daily intake in the United States is 2.6 mg for those ingesting fluoridated water and 0.9 mg for those ingesting non-fluoridated water.
5. Silica - This mineral plays an important role in the metabolism of the collagenous matrix in bone. Specifically:

“Bone collagen is reported to increase with silica supplementation and the mineral appears to strengthen the connective tissue matrix by cross linking collagen strands. Dietary silicon appears to increase the rate of mineralization particularly when calcium intake is low.”

Recommended daily intake is 20 to 30 mg which can be obtained from several foods and herbs such as horsetail grass and oat, wheat, or rice straw.

6. Zinc - This mineral is involved with osteoporosis because:

“A deficiency of zinc prevents full absorption of calcium. Equally zinc enhances the biochemical activity of vitamin D.”

In addition:

“Zinc is essential for bone healing and increased amounts are found at the sites of bone repair.”

Lower levels of both blood and serum zinc are seen in osteoporotic women as compared to non-osteoporotic women. The recommended daily intake is 12 mg for females and 15 mg for males.

7. Manganese - The need for manganese in relation to proper bone metabolism was popularized by the chronic injury problems of Bill Walton, the professional basketball player, who was found to have no detectable levels of manganese in his blood.

“Research subsequent to this incident documented that manganese plays an essential role in bone cartilage and bone collagen formation and is required for bone mineralization. Osteoporotic changes in bone can be brought about by manganese deficiency, which appears to increase bone breakdown while decreasing new bone remineralization.”

Is deficiency a problem? One study showed that osteoporotic women had one-quarter the manganese levels of non-osteoporotic women. Typical recommended consumption levels are 2 mg per day for adults. However, given the fact that large intakes of calcium, phosphorus, iron, and zinc depress manganese absorption, many researchers are now recommending adult daily intakes of 3.5 to 7.0 mg.

8. **Copper** - **“...copper aids in the formation of collagen for bone and connective tissue. As with manganese, inadequate copper levels have been associated with the development of osteoporosis.”**

Dr. Brown goes on to state:

“Like many other minerals, copper excretion is increased on a diet high in sugar, sweeteners and refined flour. Also, some researchers suggest that the milk sugar, lactose, might interfere with copper metabolism making high dairy intake less than ideal for copper utilization.”

Copper is found to be deficient quite often in the American diet (**Editor’s note:** Copper deficiency has been reported by many to be highly regional in nature. In the northeast United States, concerns about copper generally revolve around excess as opposed to deficiency.) Recommended intake for everyone over 11 years of age is 1.5 to 3.0 mg per day.

9. **Boron** - While the story on boron is far from complete, it appears that boron impacts on bone metabolism by increasing levels of both estrogen and testosterone. The net effect is optimization of calcium, magnesium, and phosphorus metabolism. Recommended intake of this nutrient is 2 to 3 mg per day.
10. **Vitamin D** - This nutrient plays a major role in bone metabolism, specifically due to its regulatory effects on calcium and phosphorus. Dr. Brown notes the following concerning vitamin D:

“Low vitamin D status, as low calcium status, leads to overactivity of the parathyroid gland. An overactive parathyroid in turn promotes bone loss. This factor is especially important in the elderly.”

“Numerous studies now document that up to 80 percent of all hip fracture patients may exhibit vitamin D deficiency.”

“Research now indicates that women past menopause can actually halt bone loss and even increase their bone density over the course of the year by consuming adequate calcium and getting extra vitamin D...during the dark days of winter.”

Recommended intake is 200 I.U. for adults and 400 I.U. for growing children. However, some researchers are recommending that individuals over 65 years of age ingest 600 to 1,000 I.U. of vitamin D per day to compensate for decreases in absorption. In addition, keep in mind that vitamin D is produced in our bodies upon exposure to sunlight. **“Brief, casual exposure of the face, arms and hands to sunlight is thought to be equivalent to the ingestion of 200 I.U. of vitamin D.”** However, please keep in mind that internal production also decreases with age. In addition, please note that daily intake levels of 2,000 I.U. per day or more can be toxic.

11. **Vitamin C** - **“Among a host of other things, vitamin C is required for the formation of collagen and thus is essential for healthy bones.”** In addition, vitamin C plays an important role in the production of adrenal steroid hormones, which also are important in optimizing bone health. Brown feels that the ideal intake is anywhere from 250 mg to 2,000 mg per day. Intake levels on the higher end would be indicated for the elderly, the ill, smokers, and institutionalized patients.
12. **Vitamin A** - **“Vitamin A helps in the development of osteoblasts, the bone-building cells which lay down new bone. A deficiency of vitamin A also limits calcium metabolism which results in poor bone growth.”** Average adult intake levels is 4,000 to 5,000 I.U. per day. As with vitamin D, it should be kept in mind that excessive vitamin A can be toxic. For pregnancy it is recommended that daily intakes do not exceed 8,000 I.U. per day.

13. **Vitamin B₆** - Vitamin B₆ is important in bone metabolism in one direct way and several indirect ways. First, vitamin B₆ is directly involved in bone metabolism due to its being **“...a necessary co-factor in the enzymatic cross-linking of collagen strands which increase the strength of connective tissue.”** Indirectly, vitamin B₆ plays a role by being necessary for HCl production, which, in turn, is required for proper calcium absorption. B₆ is also required for proper adrenal function, which, in turn, plays a major role in maintaining optimal mineral balance. Finally, vitamin B₆ is involved in the breakdown of homocysteine, which can be increased in menopausal women. What is the significance of homocysteine in relation to osteoporosis? Dr. Brown states:

“Homocysteine...interferes with collagen cross-linking leading to defective bone matrix and osteoporosis.”

Is vitamin B₆ deficiency related to osteoporosis clinically? One study has found that B₆ deficiency is more prevalent in those who suffer hip fractures. The recommended dose for vitamin B₆ is 2 mg per day with a slight increase during pregnancy and lactation.

14. Vitamin K - According to Dr. Brown, Alan Gaby, M.D. feels that vitamin K may be as important to bone as calcium. Why is this?

“Vitamin K is required for the synthesis of osteocalcin, the bone protein matrix upon which calcium crystallizes. Osteocalcin provides the structure and order to bone tissue; without it bone would be fragile and easily broken. Vitamin K also aids in the binding of calcium to the bone matrix.”

The evidence for clinical use of vitamin K for osteoporotic patients is quite compelling. For, this nutrient is not only found to be low in osteoporotic patients, its supplementation has dramatically reduced calcium losses for many. Another interesting fact is that, in osteoporotic patients, the ability of osteocalcin to attract calcium is reduced. This reduction in attraction has been normalized by administering 1 mg of vitamin K daily for two weeks. Finally, preliminary evidence suggests that vitamin K plays a key role in healing of bone fractures. Recommended intake of this nutrient is 70 to 140 mcg per day for adults, although Dr. Gaby recommends 150 to 500 mcg daily.. However, it should be kept in mind that much of the body’s stores of vitamin K are produced by the resident microflora in the gut. Finally, two important caveats should be kept in mind concerning vitamin K:

- a. **“Vitamin K adequacy is threatened by the freezing of foods, mineral oil laxatives, rancid fats, radiation, impaired fat absorption, oral antibiotic use, sulfa drugs, and certain liver diseases.”**
- b. **“Those on blood thinning drugs such as coumadin or warfarin should not use vitamin K as it interferes with the effect of these drugs.”**

15. Vitamin B₁₂ - Vitamin B₁₂ has only recently been suggested as being important for optimal bone health. This nutrient is required for proper function of osteoblasts. Optimal intake of this nutrient has been suggested by several researchers to be significantly higher than the former RDA of 3 mcg.
16. Folic Acid - Like vitamin B₆, folic acid plays an indirect role in bone health by reducing homocysteine levels. The RDA for folic acid is 400 mcg, but many researchers recommend ingestion of 800 mcg per day.
17. Essential Fatty Acids - **“Fatty acids ...play multiple roles in bone structure, function, and development. Fats are required for proper calcium metabolism...and they are essential components of all membranes, including those of cartilage and bone.”**

“An ideal intake of omega 6 essential fats is around 9 to 30 grams per day, while six grams or more is an ideal intake for omega 3s.”

18. Protein - **“Protein is needed for the intestinal absorption of calcium and protein is a major building block for bone.”** However, as will be noted in the next section, excess protein intake is detrimental to bone health. Do Americans ingest too much protein? Most definitely, generally in the form of animal products. The RDA for protein is 44 grams for women and 56 grams for men. However, intake of twice the RDA is common.

In the next few chapters, Dr. Brown discusses, the many lifestyle factors in this country that lead to excessive bone loss and poor bone quality. One of the most important, as was mentioned above, is **excessive protein intake**. Excessive protein intake leads to bone loss because the metabolic end products of protein metabolism are phosphoric and sulfuric acids, which must be buffered by calcium. To accomplish this task, calcium is generally drawn out of bones. As would be expected, direct, **excessive intake of dietary sources of phosphoric acid** are also a problem. The usual sources are processed foods to which phosphates have been added, such as soft drinks and baked foods. **Excessive salt intake** causes problems by promoting urinary calcium loss. It is interesting to note Dr. Brown’s quote by Dr. Robert Heaney concerning combined protein and salt ingestion:

“At low sodium and protein intakes the calcium requirements for an adult may be as little as 450 mg per day, whereas if her intakes of both nutrients is high, she may require as much as 2,000 mg of calcium per day to maintain balance.”

Excessive sugar intake leads to bone loss in several ways. The first is that it is a source of calories with no nutritional value. However, more directly, high sugar intake increases urinary excretion of calcium, magnesium, chromium, copper zinc, and sodium. Sugar also limits calcium absorption and increases production of gastric HCl. This latter aspect adds to the overall acid condition of the body. **Excessive fat intake** promotes loss of calcium. **Excessive caffeine intake** has been linked with bone loss and increased fracture incidence because it causes a direct loss of calcium, magnesium, sodium, and chlorine in the urine. In addition:

“It has also been found to lower blood calcium and increase parathyroid hormone, both of which signal the body to draw calcium from the bones.”

Excessive alcohol intake and **excessive dieting** both lead to bone loss.

Non-dietary factors that cause bone loss are **too much or too little physical activity, smoking, and medications such as corticosteroids, thyroid hormone, aluminum-containing antacids, diuretics, antibiotics, methotrexate, dilantin, certain oral contraceptives, and psychotropic drugs such as Valium and Librium.** As has been discussed so often in this newsletter concerning other chronic illnesses, **toxic metal exposure** and **gastrointestinal imbalances including dysbiosis** can lead to bone loss. Finally, as with all other chronic illnesses, **environmentally induced endocrine imbalance** can cause bone loss in several ways. Especially important is **adrenal dysfunction caused by stress.** As most of you know by now, this condition can lead to **excess cortisol levels** which can cause significant urinary calcium losses.

Part Three: Regaining Bone Health

In this section, Dr. Brown discusses in detail her program for determining bone status and then maintaining or increasing bone levels. This part of the book, alone, justifies the book's purchase for both health care professionals and patients. For, the author has skillfully constructed a program of diagnosis and treatment that is both comprehensive and user-friendly. It addresses all the issues mentioned above though diet, supplementation, and other lifestyle modifications. It also does an excellent job of placing hormone and other pharmacologic therapies in an objective, non-prejudiced perspective. Because the program is so well thought-out and written, I will not attempt to summarize it here. Instead, I strongly advise that you read it yourself and then recommend it to patients.

As I mentioned in the beginning of this newsletter, osteoporosis may be the most difficult to understand chronic illness in this country. This apparent reality has, undoubtedly, contributed to the existence of the many, often contradictory theories about the causes and management of this condition. Furthermore, I would suggest that this complexity has led to confusion, which, in this country, seems to always lead to millions of wasted therapy dollars for both conventional and alternative treatments. I commend Susan Brown's culmination of twelve years of hard work and research. She has created a text that, in my opinion, is a landmark in addressing one of the most serious chronic illnesses in this country. It is my hope that you will read it yourself and generously recommend it to your patients and loved ones.