Osteoporosis

Myths, Perceptions, and Truths, and Natural Solutions with Nutrition and Botanicals

By Donald Yance

Introduction and overview

In the last twenty years the medical establishment and drug companies have helped morph the perception of osteoporosis from a rare but serious disease that affected only older women to that of a frightening epidemic, threatening close to half of post-menopausal women and up to one-third of the men in the United States.

What has changed? Frankly, not much except the hype. In the case of osteoporosis and osteopenia, I think the fear-based hype is mostly about profits, and getting as many people on as many medications as possible. Based on the diagnostics being used, however, many of these people do not have as serious a condition as they have been told. Not a lot of doctors are offering individuals healthy, natural solutions prior to doling out the prescriptions, either.

An integrative program of botanical and nutritional compounds, together with diet and exercise, can support bone health and general health—without drugs. I have seen many of my patients experience success with protocols I have designed combining herbal and nutritional medicine that enhance digestion, provide key nutrients such as Vitamin D and K, strengthen and balance the endocrine system, and actually reverse osteoporosis.

Countering the fears about osteoporosis

Bone loss and fractures have always been a concern for women over 65, and rightly so. But a couple of decades ago research indicated that bone loss speeds up in the years immediately after menopause, raising concerns about osteoporosis among much younger women. Then, all of a sudden, conventional medicine created a new condition, osteopenia, which soon was construed to be a precursor to real disease. Then the fear set in that if a person developed osteopenia they were doomed to get osteoporosis. Bone density screening via the bone mass density (BMD) test cannot decipher between calcified bone and healthy bone, nor can it, more importantly, determine the strength of your bones.[1] The test compares your bones to those of much younger women, not taking into account what your individual baseline is. I recommend getting an initial test and monitoring from that point forward, realizing that a certain amount of bone loss is natural with age. I also like to assess teeth and fingernail health because their status correlates with bone health.

The medical industry has developed brilliant tactics designed to scare people into taking drugs lest they quickly grow old and become deformed, doomed to helpless debilitation from fractured bones. This is not a new story. Remember how touted hormone replacement therapy (HRT) was for women? The idea spread quickly that without HRT one would age faster, and for almost 60 years, based on very little research, women were told that the effects of menopause—an unhealthy condition—could be countered through HRT drugs. They became the most-prescribed

in America until the reasons to fear shifted to the discovery that they directly increase the risk of breast cancer and stroke. With that news the old fear-based campaign tactics were successfully employed once again to get all women on Fosamax instead.

Healthy bone function and peak bone mass

Bone loss is a natural, vital process. Only bone loss (resorption) can initiate healthy new bone formation (deposition). As with all things in nature, good bone health relies on a balance between this action and counteraction. This is the “yin-yang” effect that I call the “anabolic-catabolic” effect. Simply put, it is the healthy relationship between building up and breaking down. Within the integrative medical model I’ve created called the *Eclectic Triphasic Medical System* (ETMS), anabolic restoration using herbal compounds and nutritional agents is a fundamental objective that is seldom addressed in botanical medicine treatment protocols for bone health, or any health condition, and it is one of the most essential areas to address as people age.

Regenerative inward anabolic energy is crucial to bone health. So we want bone loss to occur but we want to continue to build bone in relation to that loss. New bone is strong and flexible with the ability to bear both compression and tensile pressure. Bones strengthen with use, just like muscle, all through your life. But at some point, bone loss gradually begins to outpace bone growth. At some point in the 30s catabolic activity increases in relation to anabolic activity, and bone resorption begins to outpace formation by about 0.5-1.0% per year. For women, after menopause this rate may accelerate to 1.0-5.0% with the dip in reproductive hormones, although diet and botanical supplementation can effectively mitigate this. Hormone fluctuations generally settle down within five years after menopause and bone loss evens out to a gradual, normal decline of 1.0-1.5% per year. Exercise and physical stress naturally build new bone and speed the remodeling process, even when you're older. Lifting progressively heavier weights in an exercise program is for muscle as well as bone building.

What is osteoporosis anyway?

If you have established osteoporosis bone loss may accelerate over time to absorb up to 1/3rd of your total bone mass. Remaining bone is thin and porous like ruined honeycomb. Pain becomes almost constant and fractures can easily occur from a simple fall or everyday activities like walking or even coughing. Before 1994 the diagnosis of osteoporosis only occurred as a result of breaking a bone via minor impact or trauma. Since then, new bone-scanning technology has cast a wider net and allowed medicine to quantify the diagnosis. Osteoporosis is now defined by having a BMD deviating more than 2.5 points below a standard established by the average for a large sample of 20 to 29-year-olds.

Stress-imposed dysfunction of our endocrine system can cause a decline in bone density and strength

Far too frequently, the term "stress" is used in a confusing and ambiguous fashion. Stress is often defined as any perceived physical or psychological change that disrupts an organism’s metabolic balance. In common usage, stress usually refers to an event, or succession of events, that elicits a

response, often in the form of "distress" but also, in some cases, in the form of a challenge that leads to a feeling of exhilaration, as in "good" stress. The term is used to describe both the event, or stressor, and sometimes the response, as in “the stress response.”

When we make stress hormones to help us adequately deal with the life we live, we do it at a cost. Under severe stress, men stop producing sperm and hair, and women stop producing hormones and begin storing fat. In the wild, these reactions make sense because the stress of the threat passes quickly and the animal can then get back to the business of eating and procreating. However, in the human world, stress overload can become the typical pattern of our lives and I believe it is the leading cause of bone loss. This is why my protocols are built with a foundation of herbal-based adaptogenic and nutritional formulas that help us deal with stress and mitigate its costs to the body.

Long-term stress specifically leads to hypothalamus-pituitary-adrenal (HPA) exhaustion, which I believe is a major, overlooked cause of osteoporosis. I often see women, and men, with several problems or comorbid conditions: inadequate nutrition, weak digestion, low metabolic rate (often as a result of chronic dieting), lack of sleep, and stress. For these women, osteoporosis is a result, not an underlying cause, of other health conditions. Giving them a drug like Fosamax does nothing to fix the real problems. The basis for an effective, permanent solution is through the use of botanical adaptogenic remedies with enhanced anabolic actions (*Rhaponticum carthamoides, mumie, pantocrine, epimedium,* etc.) and anabolic nutrients such as amino acids found in high-quality proteins containing lactoferrin, a bone-building anabolic compound, vitamin D, and boron.

The importance of the parathyroid and thyroid glands

Calcitonin, which is secreted by the parathyroid hormone, stabilizes high levels of calcium by inhibiting osteoclast activity. Although we want to regulate this hormone through natural means, it is available as a prescription nasal spray. It is most effective in people who have osteoporosis as a result of corticosteroid use. It causes nasal irritation, headache, and joint pain.

Parathyroid hormone (PTH) is normally triggered by high levels of phosphorous in the blood with corresponding low levels of calcium. Daily injections seem to stimulate bone formation and are being used to treat women with severe osteoporosis. High doses of the medication caused bone cancer in rats so treatment is not recommended for more than two years.

Elevated Homocysteine linked to osteoporosis

Homocysteine is created when the body uses the amino acid, methionine, for methylation. Methylation is an important reaction in the body, which leaves homocysteine as a byproduct. Homocysteine is normally converted back to methionine or used to create cysteine and other useful substances. If these conversions are blocked, however, homocysteine accumulates, leading to a host of negative reactions.[2,3] Bone density is not affected directly, but a high concentration of homocysteine acts as a corrosive agent on collagen, interfering with its fibers’ ability to cross-link and form its proper attachment to the tissue, which leads to a higher risk of fracture.[4]

Abnormal metabolism and elevated blood levels of homocysteine is a condition that is highly toxic to both cellular and fibroelastic components of the vascular wall. Homocysteine can damage blood vessels and nerves, and has been linked to heart attacks, strokes, cancer (particularly colon, breast, and prostate), Alzheimer's and other neurological diseases, depression, birth defects, gout, cervical dysplasia, erectile dysfunction, rheumatoid arthritis, as well as osteoporosis.[5,6]

An emerging area of study is the relationship between bone loss and blood acidity, as well as high levels of the proinflammatory cytokines (IL-6 and TNF-a) that are evident in osteoporosis.[7]

Bisphosphonates: The good, the bad, and the ugly!

Our bones are constantly being broken down and rebuilt throughout our lives in a process called bone remodeling. As adults, this can include up to 10% of our entire skeletal mass at any one time. This process gives our bones the ability to grow and also heal after injuries. When there is an imbalance between how much bone is reabsorbed and how much new bone is made, osteoporosis occurs. This is the anabolic/catabolic balance, energy in and relation to energy out that I speak of so often, and the importance to not only bone health but also total health.

Effective anticatabolic therapies decrease fracture risk by reducing the rate of bone turnover, thereby maintaining bone microarchitecture and increasing bone mineral density. At present, oral bisphosphonates such as alendronate (Fosamax) are the preferred treatment for osteoporosis.[8,9,10] Fosamax works by inhibiting bone resorption, thereby preventing further bone loss.[11] But remember, bone function is a two-way street; if resorption is delayed, then so is formation—so if no bone is lost, no new bone is made. Recent reports suggest that some patients using bisphosphonates may be unable to repair or replace older or damaged bone.[12,13,14] When do the drug's beneficial effects potentially outweigh negative health consequences? Are there other, better solutions?

The original use of bisphosphonates was industrial: additives for preventing calcium carbonate deposits in washing powder, water, and oil brines.[15] Scientists discovered that bisphosphonates inhibit bone resorption in the late 1960s. Bone density tests proved that these drugs increased bone density as long as they were taken regularly. The FDA approved Fosamax for use in the treatment and prevention of osteoporosis in 1995—the year after osteopenia was deemed a medical condition. Sales are now in the billions per year. Bisphosphonates are also frequently used for the treatment of skeletal metastases from solid tumors, hypercalcemia of malignancy, multiple myeloma, Paget's disease, and osteogenesis imperfecta.[16]

Oral bisphosphanates like Fosamax are poorly absorbed with less than 5% bioavailability. Oral doses have to be taken 30 minutes before taking anything else since all food and beverages (including mineral water) interfere with the absorption. Of the absorbed bisphosphonate, 20-80% is incorporated into bone, with the majority binding to bone with an already-high turnover.

Since almost half of women over 50 are alleged by conventional medicine to be at risk for osteoporosis, it seems we are in the midst of yet another grand experiment similar to that of HRT. When women are put on Fosamax without addressing other systemic issues, they face a

steady downward spiral that begins with worsening GI issues and culminates in debilitating joint and bone pain and general metabolic/physical degeneration. This effect for many will lead to more prescriptions—NSAIDS for pain, protonics like Nexium and Prilosec for digestive issues, and Lipitor for high cholesterol.[17]

More to the point, there is practically no long-term research being done on the safety of combining these drugs with Fosamax. According to one limited study of Fosamax and naproxen (a popular NSAID prescribed for arthritis pain), 38% of users developed stomach ulcers and 69% experienced serious side effects, leading the authors to conclude that the drugs had a synergistic effect that promoted gastric ulcers.[18] If you understand that bone health depends on your stomach's ability to digest protein, calcium, and other minerals, you can see how very detrimental this is.

Cases of esophageal cancer in patients who had been taking oral bisphosphonate drugs for osteoporosis have been reported by an official from the Food and Drug Administration (FDA) in the January 1 issue of the *New England Journal of Medicine.* Twenty-three cases (of which eight were fatal) have been reported in the United States, all of them in association with Fosamax, which was cited as the suspect drug in 21 cases and as a concomitant drug in two cases.[19]

A recent study was conducted to examine the hypothesis that risk of esophageal, but not of gastric or colorectal, cancer is increased in users of oral bisphosphonates. Nested case-control analysis within a primary care cohort of about 6 million people in the UK, with prospectively recorded information on prescribing of bisphosphonates. Men and women aged 40 years or over-2954 with oesophageal cancer, 2018 with gastric cancer, and 10 641 with colorectal cancer, diagnosed in 1995-2005; five controls per case matched for age, sex, general practice, and observation time. The conclusion of this study found that the risk of esophageal cancer increased with 10 or more prescriptions for oral bisphosphonates and with prescriptions over about a five year period. In Europe and North America, the incidence of esophageal cancer at age 60-79 is typically 1 per 1000 population over five years, and this is estimated to increase to about 2 per 1000 with five years' use of oral bisphosphonates.[139]

Foods that improve bone health

Isoflavones-rich botanicals, as well as foods rich in these compounds such as fruits, vegetables, seeds, legumes, and traditional soy foods can also improve bone health. Isoflavones, one class of phytoestrogens, are nonsteroidal plant-derived compounds that exhibit very mild estrogenic activity at several sites, including the bone, which has predominantly estrogen beta-receptor sites. Isoflavones are derived largely from fermented soy and offer a healthy solution to the bone health, in part because they have an affinity for estrogen beta receptors. Animal and humans studies have confirmed a reduction in bone resorption resulting from isoflavone intake.[20]

Wouldn't it make more sense to correct vitamin and mineral deficiencies, make dietary and life style changes, and use anabolic-bone building botanicals, to build bone density first, before you decide to take Fosamax or another bisphosphonate? Adaptogenic herbs with enhanced anabolic effects, can naturally improve testosterone, DHEA, growth hormone, and overall anabolic metabolism, enhance and balance the endocrine system, bringing hormone levels to a healthy

normal range.

Nutrition and Osteoporosis

Adequate nutrition influences all aspects of bone health throughout the lifecycle, from the development of peak bone mass through to the maintenance of bone mass in adults and the reduction of bone loss and fracture in the elderly. Because nutrition is a modifiable pathogenic factor of osteoporosis, which has important practical and public health implications, it should be one of the first attempts to improve bone health and help prevent and manage osteoporosis. But, sadly, it is not. Eating a diet that is good for bone health is eating a diet good for total health.

Essential bone-enhancing nutrients to consider for supplementation:
Specific nutrients: Vitamin D, Calcium, Magnesium,Vitamin K, Boron, B-12, folic acid, Vitamin C, Ipriflavone, strontium, silica (Horsetail extract); *Food concentrates:* Undenatured Whey Protein, Colostrum (rich in Lactoferrin), EPA/DHA (fish oil) & GLA, 'Fermented' soy concentrates (Miso, Natto, Soy Essence) rich in Isoflavones, Seaweed; *Botanical Medicine:* Adaptogens with enhanced anabolic effects, bone-building botanicals that possess positive hormone effects in the body: Chaste tree (*Vitex agnus castus*), phenolic-rich companion adaptogens, green tea extract (>95% phenols, 40% EGCG), grape seed or bilberry, Red clover extract (>30% isoflavones), Nutrient-rich botanicals: Comfrey [PA free], Horsetail.

First and foremost, a diet rich in plant phenols, vitamin C, folic acid (fruits and vegetables), magnesium (whole grains, nuts and seeds), omega-3 fatty acids (cold water fish [also contains vitamin D], flax seeds), boron (plums or prunes are the richest source), and isoflavones (fermented soy), as well as a good dose of sunshine are vital for good bone health.

Fruit and vegetable intake: Evidence supporting the immense disease-preventative benefits of fruits and vegetables continues to expand with respect to heart disease, stomach, bowel, and breast cancer, and stroke.[21] Many population-based studies have found a positive association between a high intake of fruits and vegetables (hence, high intakes of potassium, magnesium, calcium, carotenoids, fiber, isoflavones, phenols, sterols, and lignans) in the diet and bone mass.[22-25] Besides the value in the overall nutritional content, another purported mechanism may lie in the beneficial effect of the alkaline environment induced by such a diet.[26]

A study done by Wachman and Bernstein in the 1960s found that the skeleton is not only a labile reservoir of calcium responsive to the mechanisms that maintain ionic calcium, but is also a reservoir of alkaline salts of calcium, which provide a source of labile base that can be used to react to blood pH and plasma bicarbonate concentrations.[27] Acid-base homeostasis disruptions in adults may be related to the progressive decline in bone mass with aging. Bone loss may therefore be attributable, at least in part, to the life-long mobilization of skeletal salts to balance the endogenous acid generated from foods that are "acid-producing."[28] It is well known that potassium administration results in a reduction of urinary calcium and potassium deprivation stimulates bone resorption, thus potentially causing a more negative calcium balance. Supplementation of potassium bicarbonate in postmenopausal women has been shown to improve calcium uptake, reduce bone resorption, and increase the rate of bone formation.[29]

Protein-to-potassium ratio in the diet appears to predict net acid excretion via the urine, and net acid excretion via this route predicts calcium excretion. This means that women who have the most "acidic" diets have the poorest bone density and the highest level of bone resorption. It's also possible that the body tries to neutralize acidic blood (i.e., low pH) by releasing more bone calcium, magnesium, and potassium.[30]

Soy isoflavones: Soy foods have received considerable research for their role in disease prevention, especially in relation to heart disease, osteoporosis, and cancer. Much of the research interest in soy is aimed at establishing the physiological effects of isoflavones. Isoflavones are diphenolic compounds that have a very limited distribution in nature. Soybeans and traditional soy foods are the richest dietary sources of isoflavones. Isoflavones are weak estrogens in that they bind to estrogen receptors, but they also have important nonhormonal properties as well that greatly contribute to their health benefits. In animal models, isoflavones retard bone loss almost as effectively as estrogen does. Most research also indicates that soy foods rich in isoflavones favorably affect bone turnover and spinal bone mineral density in perimenopausal and postmenopausal women.[31]

Vitamin D: The most important nutrient (actually a non-steroid hormone) for bone health is vitamin D. Since perhaps as many as 80% of the adult population is vitamin D deficient, wouldn't it make sense to correct vitamin D deficiency with supplementation?[32] Additionally, it would not only help reduce osteoporosis but many forms of cancer including breast, prostate, colon, and pancreatic, autoimmune diseases, and even heart disease?

Vitamin D rather than calcium intake is important in protecting post-menopausal women from fractures associated with osteoporosis. As far back as twenty years we have known of the need for vitamin D supplementation (particularly during the winter months) to inhibit bone loss and osteoporosis.[33] The elderly population is especially at risk for vitamin D deficiency. Researchers at the Brigham and Women's Hospital and the Harvard Medical School in Boston found that an adequate vitamin D intake can lower the risk of osteoporotic hip fractures in post-menopausal women; however, consumption of calcium both in supplement form and in food failed to have any effect.[34]

I am a much stronger proponent of vitamin D supplementation and would rather have folks get as much dietary calcium as they can rather than from supplements. I have found some people need to supplement in the winter months, while others need to supplement all year, taking increased amounts in winter—often double that needed in the summer. I advise all people to get vitamin D levels (25H) checked. I recommend levels be between 50 and 100. I have been monitoring levels in people for many years and have found the majority of people to be deficient, even during the summer months. I have also found that supplementation must be individualized; it may take very high amounts of vitamin D3 supplementation (between 2000-8000 IU) to get some people normalized.

Calcium and the importance of good digestion: Calcium requires a lot of digestive teamwork including adequate stomach acid, a whole alphabet of vitamins, magnesium, other essential minerals, and a well-functioning GI tract to deliver calcium's many benefits. If you have GI issues, including IBS, celiac disease, or even heartburn, you can't absorb the calcium. Many

people, particularly older people, lack the digestive acids necessary to break down and absorb calcium. Also, people are told that antacids like Tums are good calcium supplements, but antacids actually oppose the very stomach acid (hydrochloric acid) needed for calcium absorption. Protonics like Nexium can pose an even more serious problem.

If you have deficiencies anywhere along the line, it won't matter how much calcium you eat, your body will take it (and whatever other minerals it needs) from your bones. The body's reaction to stress includes a chain of events wherein calcium is pulled from the bones because of the increased demand for it elsewhere. Remember, bone health is very much connected to other areas of your body including your teeth, hair, and nails.

Two important things I recommend are to add 1-3 teaspoons of apple cider vinegar to water and sip this during your main meals, and consume pre- and probiotics daily in your meals. Prebiotics in the form of foods rich in inulin, such as sunchokes, asparagus, and chicory act as prebiotics, enhancing absorption of vitamins and minerals. Probiotics come from fermented foods such as high-quality kefir, yogurt, sauerkraut, and natto. These groups of foods generally have wonderful health benefits, from gut health to inhibition of infections, immune system enhancement, and disease prevention—including cancer prevention.

I only recommend a high-quality, fully chelated calcium supplement of 400-600 mg. and only for those with known osteoporosis and/or the elderly who cannot get enough through diet alone.

In Traditional Chinese Medicine the bones are ruled by the kidneys, or what I call the "Kidney Network," and a diet that fortifies the kidneys is great for bone health. This includes such foods as sesame seeds (black and white), walnuts, seaweed, eggs, and shrimp. Water made from shrimp or eggshells is an excellent for bone health and can be used as a base for soups and sauces.

Important nutritional aids for calcium absorption: Again, the real health risk for bone fractures is vitamin D not calcium deficiency; however, other nutrients are worth discussing, like magnesium and phosphorous. Magnesium increases calcium absorption from the blood into the bone. Dairy products contain little magnesium and alcohol depletes it. Ironically, too much calcium blocks the absorption of magnesium, leading to a deficiency characterized by hair loss, muscle cramps, irritability, trembling, and disorientation.[35] A good balance between calcium and phosphorous (about 5:1) is crucial to bone strength, but too much phosphorous (soda and red meat) depletes calcium.

Vitamin K: Human intervention studies have demonstrated that vitamin K can not only increase bone mineral density in osteoporotic people but also actually reduce fracture rates. Further, there is evidence that vitamins K and D work synergistically on bone density.[36]

Boron: Boron is essential to animals and humans for bone metabolism and joint health. It has been shown to improve calcium absorption and enhance collagen synthesis. Boron appears to help normalize the levels of several hormones including testosterone, vitamin D, calcitonin, and estrogen.[37] Studies have shown that participants taking boron supplements reap the benefits of harder and stronger bones.[38]

EPA/DHA and GLA: Evidence is accumulating that specific dietary lipids, namely the omega-3 fatty acids, eicosapentanoic acid (EPA) and docosahexanoic acid (DHA), and gamma linolenic acid (GLA) play an important role in bone health. These dietary lipids are involved in regulating calcium excretion, growth hormone secretion, fatty acid metabolism, and osteoblast formation.[39]

Getting the right balance of omega-3s and omega-6s in the diet may ward off much of the bone loss seen with post-menopausal osteoporosis. While both types of fats are essential for human health, diets with a high ratio of omega-6 fatty acids to omega-3 fatty acids are associated with cardiovascular disease, cancer and inflammatory and autoimmune diseases. A low ratio of omega-6 to omega-3 fatty acids, however, may promote cardiovascular health, improve memory and protect bone health. One thing to keep in mind as well is that most people consume omega-6 fatty acids that are highly refined and oxidized, which is even more of a health concern. Diets with a low ratio of omega-6 fatty acids to omega-3 fatty acids minimize bone loss typically brought on by the low levels of estrogen in women after menopause. Omega-3 fatty acids help promote bone formation. Also, higher intake of omega-6 fatty acids lead to an increased production of compounds of which a lack is associated with bone loss.[40]

Folic acid, B-12 and other B-vitamins: Taking supplements of folic acid and other B vitamins already known to prevent severe birth defects and shown to lower risk of death from heart disease, can also help to prevent broken bones in the elderly.

Many studies have shown that increase homocysteine levels significantly raise the risk of both hip fracture and other broken bones resulting from osteoporosis. B vitamins including folic acid and B-12 have been shown to lower levels of the amino acid homocysteine, reducing its potential damage to the arteries and atherosclerosis. High homocysteine levels in the blood have also been linked to risk of dementia in the elderly.[41]

Whey protein concentrate (WPC) has the highest biological value of any protein source available and should be incorporated into programs for all types of people. WPC is a balanced source of essential amino acids and peptides. When un-heated and non-denatured, it is an excellent source of sulfur amino acids (menthionine and cysteine) as well as branched-chain amino acids (leucine, isoleucine and valine).[42] Undenatured WPC leaves up to 99% of the peptides undamaged. WPC has the highest protein efficiency ratio (PER), the highest biological value (BV), scores highest on the Protein Digestibility Corrected Amino Acid Score, and has the highest Net Protein Utilization (NPU) of all proteins.43 Besides being a great source of protein, WPC is rich in cysteine and is an excellent source of nutrients for building glutathione (GSH), an important, protective antioxidant.[44-53]

WPC is second only to colostrum in the iron-binding protein, lactoferrin. The lactoferrin content of high quality colostrum is 4.4% and WPC is about 3.2%. Lactoferrin has powerful immune-enhancing as well as bone-building properties. Researchers have discovered two new receptors on the bone-forming cells and lactoferrin is working through at least one of these to promote bone growth. Lactoferrin both inhibits the formation of the osteoclast cells that resorb bone and stimulates the osteoblast cells that form bone. Remember, healthy bone depends on continual regeneration, carried out by the two main types of bone cells.[54-57]

Prebiotics in the form of inulin-oligofrutose, also referred to as *fructo-oligosaccharides* (FOS), promote the growth of beneficial intestinal microflora populations, which appears to help promote bone growth.[58]

L-Arginine and L-Lysine: L-arginine is a protein amino acid present in the proteins of all life forms. It is classified as a semi-essential or conditionally-essential amino acid. This means that under normal circumstances the body can synthesize sufficient L-arginine to meet physiological demands. L-arginine, *when administered along with L-lysine,* stimulates pituitary release of growth hormone and assists the pancreas with the release of glucagon and insulin.[59-65] L-arginine and L-lysine are involved in bone metabolism and growth, whereby supplementation has shown a positive effect on osteoblasts related partly to the production of various growth factors required for matrix synthesis, and partly to the direct or mediated activation of cell proliferation.[66]

Strontium ranelate

Strontium is the most recent supplement that is showing promise for osteoporosis. In Europe, a form of Strontium, Strontium ranelate, has been studies over the past several years for osteoporosis and it appears to be very effective. 4 randomized, double-blind, placebo-controlled trials have now been done on Strontium ranelate, which is made up of 2 atoms of strontium and the organic acid ranelic acid. Three trials evaluated strontium ranelate 0.5-2 g/day for osteoporosis treatment, and 1 study evaluated 125 mg-1 g/day for osteoporosis prevention. For treatment, strontium ranelate 2 g/day for 3 years reduced vertebral fractures by 37% (relative risk [RR] 0.63; 95% confidence interval [CI] 0.56, 0.71) and nonvertebral fractures by 14% (RR 0.86; 95% CI 0.75, 0.98). Lower doses were superior to placebo, but reduction in vertebral fractures and increase in bone mineral density were greater with 2 g/day.[133]

A recent study was conducted to evaluate the effectiness of strontium ranelate at reducing the risk of vertebral and nonvertebral fractures during 5 years. This study analyzed a subgroup of 1489 female patients over 80 years of age (mean 83.5+/-3.0 years) with osteoporosis from the SOTI (spinal osteoporosis therapeutic intervention) and TROPOS (treatment of peripheral osteoporosis) studies randomized to strontium ranelate 2 g/d or placebo. All received a supplement of calcium plus vitamin D. The Strontium ranelate group, reduced by vertebral fracture by 31% (relative risk, RR=0.69; 95% confidence interval, CI 0.52-0.92), nonvertebral fracture risk by 27% (RR=0.73; 95% CI 0.57-0.95), and hip fracture risk by 24% (RR=0.76; 95% CI 0.50-1.15, not significant). Strontium ranelate safely produced a significant reduction in vertebral and nonvertebral fracture risk during 5 years in postmenopausal women over 80 years of age and was cost saving.[133]

The mechanism by which strontium improves bone health include increased expression of type I collagen and reduced production of matrix metalloproteinases (MMP-1 and MMP-2) without modifying the levels of the tissue inhibitors of MMPs (TIMPs).[141]

Herbal Medicine for Osteoporosis

Osteoporosis is brought on by age, stress, depletion of the neuroendocrine and endocrine system

and overall increase in catabolic-to-anabolic ratio, and a chronic state of inflammation. Within the *Eclectic Triphasic Medical System* (ETMS), osteoporosis, energetically speaking, is caused primarily from a depletion of Vital Essence, one of the three main Energies within Branch I, the human energetic branch. The endocrine system energetically emanates through our Vital Essence and we can relate it to the metabolic model of aging.

Vital Essence is rooted in the Kidney-Energy-Network (KEN) and it includes all the endocrine glands—primarily the hormone secreting glands of the pituitary, adrenal, thyroid, parathyroid, pineal, and reproductive organs. This is why the KEN is considered the most important system, both functionally and energetically speaking, and why the focus on increasing the overall strength of the KEN and keeping its energy flow in harmony, is the foundation to preventing and treating osteoporosis and all chronic disease. Traditional Chinese and Japanese formulas that restore the KEN and Vital Essence are clearly useful for bone health.[67,68]

Interventions using botanicals which build anabolic "Essence" and mediate the neuroendocrine and endocrine systems is the best approach. Treatment with botanical and other natural agents for the enhancement and normalization of levels of somatic and neuronal tissues and important anabolic hormones including dehydroepiandrosterone (DHEA), testosterone, thyroid hormone, and human growth hormone ameliorate the health decline associated with aging, including bone degeneration. The goal needs to be to build up the entire system. Anabolic metabolism determines a great deal more than one's muscle mass; it influences bone growth and health, immunity, protein synthesis, cell proliferation, bioenergetics, cell communication, endocrine function, and mood and behavior.

Leuzea (Rhaponticum carthamoides) is a natural anabolic agent that builds lean muscle, increases energy and stamina, reduces muscle breakdown during prolonged strenuous activity, has pronounced antioxidative capacity, and is also a neurological protectant. It is useful for re-building damaged muscle tissue, protecting against muscle and tissue wasting (cachexia and sarcopenia), it regenerates organs such as the liver, kidney, heart, and brain, and activates sexual behavior. Research shows that this plant can significantly increase muscle mass while decreasing body fat in athletes who used it while exercising. Rhaponticum extract has also been shown to increase performance in athletes.[69-72] Although there isn't much research on this plant as it relates to menopause, it also contains an array of flavonoids that act as phytoestrogens, and together with the ecdisterones, this makes it an exceptional agent. I have seen women in my clinic garner excellent results combating the discomforts of menopause with a formula that features Rhaponticum.[73]

Ecdisterones, also called Phytoecdisterones, are polyhydroxyethylated sterols contained in different vegetative organs of more than 80 types of plants. The anabolic effect of ecdisterones is connected not with induction of RNA synthesis but with the acceleration of translocation processes. Ecdisterones are classified as natural anabolic compounds that increase the formation of various substrates (proteins, glycogen, fats, etc.) over the processes of their catabolism.[74]

Goat weed (*Epimedium brevicornum or grandiflorum*) enhances the neuroendocrine and endocrine system, possesses an overall androgen enhancing effect, and increases peripheral circulation via its vasodilating effect. It contains important flavonoids including **icariin**, which is

what the plant is standardized to. Flavonoid content is an important marker for effectiveness of the herb.[75]

In TCM, epimedium is classified as a 'kidney yang tonic' and has been used to treat cardiovascular disease, cerebral deficiency with memory loss, depression, hormone deficiencies, fatigue, impotence, infertility, irregular menses, low sperm count, reproductive deficiency with male sexual disinterest (low libido), sexual neurasthenia, spermatorrhea, sterility, as well as for immune deficiency (HIV), and cancer.[76-80] Epimedium is also immune activating and enhances neurological activities. In deficient states, the herb can stimulate the growth of the prostate and testes and raise testosterone levels, and suppress prostate cancer. Epimedium has a phytoestrogenic effect, further contributing to its anticancer effects.[81]

In addition, this herb has also demonstrated the property of being able to modulate catecholamine production, and to possess a protective/normalizing effect on the hypothalamus-pituitary-adrenal (HPA) axis.[82]

***Mumie* (*Asphaltum bitumen*) "Russian Mountain Rock juice"** is a reputed rejuvenator and immunomodulator, claims to arrest the process of aging and prolong life. Mumie, also often referred to as "Black Anabolic" in Russia, has pronounced anabolic activity, accelerates protein and mineral metabolism increasing lean muscle mass, and has been shown to build bone density (anabolic). Mumie also possesses anti-stress adaptogenic actions, anti-cancer properties, improves cognitive abilities, and inhibits aging of the brain.

Mumie is a 100% natural product and consists of more than 50 elements. It is similar to the Ayurvedic medicine "*shilajit*," sometimes called mineral pitch. Mumie is a compact mass of vegetable organic substance composed of a tar-like, gummy matrix interspersed with vegetable fibers, fossilized honey, bees' nests, and other earthy matter which seeps over long periods of time through certain rocks, under the influence of spring water. It is collected on the ground or found flowing out from between fissures in these rocks. It helps maintain physical and mental efficiency and thus prolongs life span.[83-92]

Cissus (*Cissus quadrangularis*) is a medicinal plant native to the southern parts of Ceylon and India. It was prescribed in Ayurvedic texts as a general tonic and analgesic, with specific bone fracture healing properties. It possesses anabolic and androgenic-enhancing effects, increases intramuscular creatinine levels which in turn increases strength and endurance, inhibits the cachexic effect of cortisol, and mobilizes fibroblasts and chondroblasts to an injured tissue to help with regeneration. It is very effective for the mitigation of the many insults stress doles out to the body.[93-99]

Royal jelly (*Apis mellifica*) is the mystical food exclusively consumed by the queen bee. Royal jelly is a thick, extremely nutritious, creamy-white liquid secreted by the hypopharyngeal glands of the nurse worker bees. It has anabolic effects, can enhance testosterone, and displays activities similar to other steroid hormones shown to inhibit osteoporosis. In addition, royal jelly actually stimulates bone formation via an endocrine-modifying mechanism and by increasing the absorption of calcium.[100-116]

Pantocrine *(Cornu cervi parvum)* promotes protein synthesis, building lean muscle and tissue. Many prominent research institutions around the world have carefully studied potential effect of deer antler velvet on longevity in the human body. "Pantokrin" is a specific pantocrine product manufactured by a Russian State Pharmaceutical company and is officially approved by the Ministry of Health. It is a purified, aqueous-alcohol extract, optioned from the young Siberian spotted deer.[117]

Pantocrine has profound anabolic effects including its ability to enhance somatomedin-C, which is related to human growth hormone (HGH). Pantocrine works harmoniously within the internal network of the body, fortifying the Vital Essence. Research has shown that deer antler is useful for the healing of wounds after surgery, broken bones, and could aid in trauma recovery. Its anabolic effects are important for reducing wasting and debilitation.[118-125]

Green tea (*Camellia sinensis*) is a rich source of epigallocatechin-3-gallate (EGCG), which is associated with increased bone mineral density. A study conducted on the effects of EGCG on the formation of mineralized bone demonstrated a dose-dependent increase in the number and area of mineralized bone. EGCG also increased alkaline phosphatase activity, an early marker of osteoblastic differentiation. This study found that green tea, and specifically EGCG has beneficial effects on bone health.[126]

Chaste tree (*Vitex agnus castus*) is a popular herb for females rich in flavonoids including castican, orientin, and isovitexin, and iridoidglycosides, agnuside and aucubin. Vitex works on the hypothalamus-pituitary-reproductive system. It is known for its ability to treat corpus-luteum insufficiency in women, which leads to a relative deficiency of progesterone. It possesses cancer-suppressing effects and improves bone health.[127] In a recent animal study Vitex demonstrated osteoprotective effects by preserving the cortical as well as trabecular bone. Testosterone supplementation has positive effects on trabecular bone, concurrently counteracted by the loss of cortical bone.[128-131]

Hops (*Humulus lupulus*) Hops, an essential ingredient in most beers, contains a number of prenylflavonoids, among which 8-prenylnaringenin (8-PN) could be the most potent phyto-estrogen currently known. Other important related compounds include prenylflavonoids xanthohumol (X), and isoxanthohumol (IX).[134]

Hops extract, rich in 8-PN, is an effective compound for preventing and treating osteoporosis.[135]

'Lifenol' is a unique standardized extract from hops, rich in prenylflavonoids including 8-PN. It is the only Hops product that has been clinically proven to relieve menopausal symptoms.[136-138]

Simple Nutrient-rich mineralizing bone tea:
Horsetail, Nettles, Comfrey, and Hibiscus. Make as a strong infusion. Drink 2-3 cups daily.

Horsetail (*Equisetum arvense & other spp.*) has traditionally been used as a soothing diuretic for the treatment of edema and urinary irritation. Horsetail is also recommended by many traditional herbalist for kidney stones, urinary tract inflammation, wound (bone) healing and osteoporosis. It is rich in silicon, which may contribute to horsetail's beneficial effects for bone

strengthening.

Nettles (*Urtica dioica*): Nettles leaf, one of my favorite overall herbs in the world, is the most nutritive dense plant in the world and is a great tonic. Many of the benefits are due to the plant's very high levels of minerals, especially, iron, calcium, magnesium, potassium, phosphorous, manganese, silica, iodine, silicon, sodium, and sulfur. Nettles leaf is also rich in chlorophyll and a good source of vitamin C, carotenoids, and B vitamins. Nettles also have high levels of protein.

Comfrey (*Symphytum officinale*): Constituents of comfrey include mucilage, steroidal saponins, tannins, inulin, vitamin B12, trace amounts of proteins, and sometimes pyrrolizidine alkaloids (PAs), which are potentially toxic to the liver. PA-free comfrey is what I use in my clinic.

Hibiscus (*Hibiscus sabdariffa L.*): Originally native from India to Malaysia, Hibiscus (*H. sabdariffa*) is now widely distributed and cultivated in tropical and subtropical regions all around the globe. Hibiscus is a common tea served in many traditional cultures, and added to many commercial teas for its wonderful taste and beautiful red color.

Elderberry (*Sambucus Sambucus nigra or williamsii*)
Elderberries are rich in vitamin C and a wide range of important flavonoids, including quercetin and anthocyanins, which are believed to account for the wide range of therapeutic effects. Recently elderberry extract was found to build bone and Prevent osteoporosis. The results of a recent study found that Elderberry extract could dose-dependently decrease urinary Calcium (Ca) excretion and increase serum Ca level in animals. It could increase tibial bone mineral density and exert beneficial effects on the microarchitecture of trabecular bone. Elderberry extract suppressed the ovariectomy-induced expression of Cbfa1 mRNA and cathepsin K mRNA and enhanced the ratio of OPG/RANKL mRNA expression in the tibia. In vitro study showed that elderberry extract dramatically reduced the number of TRAP-positive cells in RANKL-induced RAW 264.7 cells. The present study indicated that Elderberry could improve bone properties by inhibiting the process of bone resorption and stimulating the process of bone formation.[140]

Concluding recommendations

Osteoporosis is really only as frightening as we let it be. With some attention to diet and implementation of healthy lifestyle changes, most women can prevent, treat, and even reverse bone loss without drugs and their side effects.

In TCM, osteoporosis is considered a weakness of the Kidney Energy Network with physical manifestations of not feeling supported in life. Our youth-obsessed culture tends to undermine our self-esteem as we age rather than celebrate what we have learned and accomplished. As we continue on the amazing journey of life, maybe we can begin to see that time will actually make us stronger. And with the right support, our bones will help carry the load.

References

[1] Cummings SR, Xu L, Chen X, Zhao X, Yu W, Ge Q., Bone mass, rates of osteoporotic fractures, and prevention of fractures: are there differences between China and Western countries? Chin Med Sci J. 1994 Sep;9(3):197-200. Review.
[2] McFarlane SI, Muniyappa R, Shin JJ, Bahtiyar G, Sowers JR. Osteoporosis and cardiovascular disease: brittle bones and boned arteries, is there a link? Endocrine. 2004 Feb;23(1):1-10.
[3] Ellenberg SS, Orloff DG, Temple RJ. Homocysteine as a predictive factor for hip fracture in older persons. N Engl J Med. 2004 Sep 2;351(10):1027-30; author reply 1027-30
[4] McLean RR, Jacques PF, Selhub J, Tucker KL, Samelson EJ, Broe KE, Hannan MT, Cupples LA, Kiel DP. Homocysteine as a predictive factor for hip fracture in older persons. N Engl J Med. 2004 May 13;350(20):2042-9.
[5] van Meurs JB, Dhonukshe-Rutten RA, Pluijm SM, van der Klift M, de Jonge R, Lindemans J, de Groot LC, Hofman A, Witteman JC, van Leeuwen JP, Breteler MM, Lips P, Pols HA, Uitterlinden AG. Homocysteine levels and the risk of osteoporotic fracture. N Engl J Med. 2004 May 13;350(20):2033-41.
[6] Raisz, L.G. Homocysteine and osteoporotic fractures--culprit or bystander?, N Engl J Med. 2004 May 13;350(20):2089-90.
[7] Rothstein, B., D.O. PYRILINKS: DYNAMIC TESTING OF OSTEOPOROSIS, Age Diagnostic Labatories, 2007
[8] Hochberg MC, Rizzoli R. Expert Opin Pharmacother. 2006 Jun;7(9):1201-10.
[9] Nelson HD, Humphrey LL, Nygren P, Teutsch SM, Allan JD. Postmenopausal hormone replacement therapy: scientific review.JAMA. 2002 Aug 21;288(7):872-81. Review).
[10] Randal J. NIH workshop tries to create consensus on HRT use. J Natl Cancer Inst. 2003 Jan 1;95(1):9-11
[11] Cuzick J.Hormone replacement therapy and the risk of breast cancer. Eur J Cancer. 2008 Nov;44(16):2344-9. Epub 2008 Sep 8.
[12] Banks E, Canfell K, Reeves G. HRT and breast cancer: recent findings in the context of the evidence to date. Womens Health (Lond Engl). 2008 Sep;4(5):427-31
[13] Riman, Tomas, HRT Use Added to Risk Factors For Epithelial Ovarian Cancer Am J Epidemiol 2002;156:363-373), and thrombosis
[14] Laino, Charlene Brenner, Benjamin, Estrogen Plus Progestin Doubles Risk of Venous Thrombosis , ASH 45th Annual Meeting: Abstract 719. Presented Dec. 9, 2003.
[15] Van den Wyngaert et al. Disambiguating the bisphosphonates *Ann Oncol.*2008; 0: mdn356v1-mdn356.
[16] G. Burnei, C. Vlad, I. Georgescu, T. S. Gavriliu, and D. Dan Osteoge
nesis Imperfecta: Diagnosis and Treatment J. Am. Acad. Ortho. Surg., June 1, 2008; 16(6): 356 – 366.
[17] Gatti D, Adami S. New bisphosphonates in the treatment of bone diseases. Drugs Aging 1999 Oct; 15: 285-96.
[18] Rogers MJ, Ji X, Russell RG et al. Incorporation of bisphosphonates into adenine nucleotides by amoebae of the cellular slime mould Dictyostelium discoideum. Biochem J 1994; 303:303–311)
[19] Chustecka, Zosia, Esophageal Cancer in Patients Taking Oral Bisphosphonates, *N Engl J Med*. 2009;1360:89-90
[20] Scheiber MD; Rebar RW , Isoflavones and postmenopausal bone health: a viable alternative to estrogen therapy? Department of Obstetrics and Gynecology, University of Cincinnati, College of Medicine, Ohio, USA. Menopause, 6(3):233-41 1999 Fall.
[21] He FJ, Nowson CA, MacGregor GA. Fruit and vegetable consumption and stroke: meta-analysis of cohort studies. Lancet 2006;367:320–6.[Medline].
[22]Steffen LM. Eat your fruit and vegetables. Lancet 2006;367:278–9.[Medline]
[23] New SA, Bolton-Smith C, Grubb DA, Reid DM. Nutritional influences on bone mineral density: a cross-sectional study in premenopausal women. Am J Clin Nutr.1997;65:1831-1839.
[24] New SA, Smith R, Foulds E, Reid DM. Associations between present dietary intake and bone health in elderly Scottish men and women. In: Ring EFJ, Elvins DM, Bhalla AK, eds. Current Research in Osteoporosis and Bone Mineral Measurement V. London: British Institute of Radiology; 1998.
[25] New SA, Robins SP, Campbell MK, et al. Dietary influences on bone mass and bone metabolism: further evidence of a positive link between fruit and vegetable consumption and bone health? Am J Clin Nutr. 2000;71:142-151.
[26] Tucker KL, Hannan MT, Chen H, Cupples A, Wilson PWF, Kiel DP. Potassium, magnesium and fruit & vegetables are associated with greater bone mineral density in elderly men and women. Am J Clin Nutr. 2000;69:727-736.
[27] Wachman A, Bernstein DS. Diet and osteoporosis. Lancet. 1968;1:958-959.
[28] Bushinsky DA. Acid-base imbalance and the skeleton. In: Nutritional Aspects of Osteoporosis '97 (3rd International Symposium on Nutritional Aspects of Osteoporosis, Switzerland, 1997). In: Burckhardt P, Dawson-

Hughes B, Heaney RP, eds. *Challenges of Modern Medicine.* Rome, Italy: Ares-Serono Symposia Publications; 1998:208-217.
[29] Sebastian A, Harris St, Ottawat JH, Todd KM, Morris RC. Improved mineral balance and skeletal metabolism in postmenopausal women treated with potassium bicarbonate. N Engl J Med. 1998;330:1776-1781
[30] Frassetto L, Todd K, Morris C Jr, Sebastian A. Estimation of net endogenous noncarbonic acid production in humans from dietary protein and potassium contents. Am J Clin Nutr. 1998;68:576-583
[31] Messina M, Messina V. Soyfoods, soybean isoflavones, and bone health: a brief overview. J Ren Nutr. 2000 Apr;10(2):63-8
[32] Pieper CF, Colon-Emeric C, Caminis J, Betchyk K, Zhang J, Janning C, Shostak J, LeBoff MS, Heaney RR, Lyles KW. Distribution and correlates of serum 25-hydroxyvitamin D levels in a sample of patients with hip fracture. Am J Geriatr Pharmacother. 2007 Dec;5(4):335-40.
[33] Dawson-Hughes B, Dallas GE, Krall EA, Harris S, Sokoll LJ, Kakoner C. Effect of vitamin D supplementation in wintertime and overall bone loss in healthy post-menopausal women. Ann Intern Med. 1991;115:505-512
[34] Feskanich D, Willett WC, Colditz GA. Calcium, vitamin D, milk consumption, and hip fractures: a prospective study among postmenopausal women. Am J Clin Nutr. 2003.
[35] Ryder KM, Shorr RI, Bush AJ, Kritchevsky SB, Harris T, Stone K, Cauley J, Tylavsky FA. 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
[36] Booth S. Vitamin K and the skeleton. Proceedings of the 4th International Symposium on Nutritional Aspects of Osteoporosis. May 17-20, 2000; Lausanne, Switzerland. In: Burckhardt P, Dawson-Hughes B, Heaney RP, eds. *Nutritional Aspects of Osteoporosis*. A Serono Symposia S.A. Publication. New York, NY: Springer-Verlag New York, Inc. 2000
[37] Newnham, R.E. (1992). "Essentiality of boron for healthy bones and joints." *Environmental Health Perspectives;* 102(Suppl 7): 83–5.
[38] Bucci, L., Nutrition Applied to Injury Rehabilitation and Sports Medicine, CRC Press, Bota Raton FL. 1995, Chapter 10, Pg. 151-160
[39] Corwin RL. Effects of dietary fats on bone health in advanced age. Prostaglandins Leukot Essent Fatty Acids. 2003 Jun;68(6):379-86.
[40] Kruger MC, Coetzer H, de Winter R, Gericke G, van Papendorp DH. Calcium, gamma-linolenic acid and eicosapentaenoic acid supplementation in senile osteoporosis. Aging (Milano). 1998 Oct;10(5):385-94
[41] Beynon J, Murray C, Vasishta S. B12 deficiency - its role in the development of osteoporosis. Osteoporos Int. 2000;11(suppl 2):S153
[42] Sindayikengera S, Xia WS. Nutritional evaluation of caseins and whey proteins and their hydrolysates from Protamex. J Zhejiang Univ Sci B. 2006 Feb;7(2):90-8)
[43] Walzem RL, Dillard CJ, German JB. Whey components: millennia of evolution create functionalities for mammalian nutrition: what we know and what we may be overlooking. Crit Rev Food Sci Nutr. 2002 Jul;42(4):353-75
[44] Gottlob RO, DeRouchey JM, Tokach MD, Goodband RD, Dritz SS, Nelssen JL, Hastad CW, Knabe DA. Amino acid and energy digestibility of protein sources for growing pigs. J Anim Sci. 2006 Jun;84(6):1396-402.
[45] Bartlett KS, McKeith FK, VandeHaar MJ, Dahl GE, Drackley JK. Growth and body composition of dairy calves fed milk replacers containing different amounts of protein at two feeding rates. J Anim Sci. 2006 Jun;84(6):1454-67.
[46] Hannan, M. et. al., 2000. "Effect of dietary protein on bone loss in elderly men and women: The Framingham Osteoporosis Study." Journal of Bone & Mineral Research, 15(12):2504-2512.
[47] Jackson, K.A., Savaiano, D.A., 2001. "Lactose maldigestion, calcium intake and osteoporosis in African, Asian, and Hispanic-Americans." Journal of the American College of Nutrition, Supplement, April, 20(2):198S-207S.)
[48] Middleton N, Jelen P, Bell G. Whole blood and mononuclear cell glutathione response to dietary whey protein supplementation in sedentary and trained male human subjects. *International Journal of Food Science Nutrition* 2004;**55**(2)**:**131-41.
[49] Bartfay JW, Davis TM, Medves MJ, Lugowski S. Milk whey protein decreases oxygen free radical production in a murine model of chronic iron-overload cardiomyopathy. *Can J Cardiol* 2003;19(10):1163-8.
[50] Bounous G, Molson HJ. The antioxidant system. *Anticancer Research* 2003;
23 2B 1411-5.
[51] Kennedy RS, Konok GP, Bounous G, Baruchel S, Lee TD. The use of whey protein concentrate in the treatment of patients with metastatic carcinoma: a phase I-II clinical study. *Anticancer Research* 1995;**15:**2643-49.
[52] McIntosh GH. Dietary proteins protect against dimethylhydrazine-induced intestinal cancers in rats. *Journal of Nutrition* 1995;**125:**809-816.

[53] Kent KD, Harper WJ, Bomser JA. Effect of whey protein isolate on intracellular glutathione and oxidant-induced cell death in human prostate epithelial cells. *Toxicol In Vitro* 2003;**17**(1)**:**27-33.
[54] Cornish J. Lactoferrin promotes bone growth. Biometals. 2004 Jun;17(3):331-5. Department of Medicine, University of Auckland, Private Bag 92019, Auckland, New Zealand. j.cornish@auckland.ac.nz
[55] Cornish J, Callon KE, Naot D, Palmano KP, Banovic T, Bava U, Watson M, Lin JM, Tong PC, Chen Q, 80. Chan VA, Reid HE, Fazzalari N, Baker HM, Baker EN, Haggarty NW, Grey AB, Reid IR., Lactoferrin is a potent regulator of bone cell activity and increases bone formation in vivo. Endocrinology. 2004 Sep;145(9):4366-74. Epub 2004 May 27.
[56] Takayama Y, Mizumachi K. Effect of Bovine Lactoferrin on Extracellular Matrix Calcification by Human Osteoblast-Like Cells. Biosci Biotechnol Biochem. 2008 Jan 7
[57] Cornish, Jill, Lactoferrin could help in osteoporosis fight, September, 2004, *Endocrinology* (vol 145, no 9, pp4366-4374) and *Molecular Endocrinology*.
[58] Lobo, Alexandre, *American Journal of Clinical Nutrition*, 2005, Vol. 82, pp. 471-476
[59] Bazzarre, T. L., Nutrition and strength, in Nutrition in Exercise and Sport, Wolinsky, I. (Ed.) CRC Press, Boco Raton, 1998, chap. 14.
[60] Isidori A, Monaco AL, Cappa M. A study of growth hormone release in man after oral administration of amino acids. Curr Med Research and Opinion 1981; 7(7): 475-81.
[61] Suminski RR et al. Acute effect of amino acid ingestion and resistance exercise on plasma growth hormone concentrations in young men. Int J Sport Nutr 1997; 7(1): 48-60
[62] Scalera F, Martens-Lobenhoffer J, Täger M, Bukowska A, Lendeckel U, Bode-Böger SM. Effect of L-arginine on asymmetric dimethylarginine (ADMA) or homocysteine-accelerated endothelial cell aging. Biochem Biophys Res Commun. 2006 Jul 7;345(3):1075-82. Epub 2006 May 11.
[63] Matsuda A, Furukawa K, Takasaki H, Suzuki H, Kan H, Tsuruta H, Shinji S, Tajiri T. Preoperative oral immune-enhancing nutritional supplementation corrects TH1/TH2 imbalance in patients undergoing elective surgery for colorectal cancer. Dis Colon Rectum. 2006 Apr;49(4):507-16.
[64] Fisman EZ, Tenenbaum A, Shapira I, Pines A, Motro M. The nitric oxide pathway: is L-arginine a gate to the new millennium medicine? A meta-analysis of L-arginine effects. J Med. 1999;30(3-4):131-48.
[65] Popovic PJ, Zeh HJ 3rd, Ochoa JB. Arginine and immunity. J Nutr. 2007 Jun;137(6 Suppl 2):1681S-1686S. Review.
[66] Torricelli P, Fini M, Giavaresi G, et al. L-Arginine and L-Lysine stimulation on cultured human osteoblasts. *Biomed Pharmacother* 2002;56:492-497.
[67] Sassa S, Sakamoto S, Zhou YF, Mori T, Kikuchi T, Shinoda H., Preventive effects of a Chinese herbal medicine, hochu-ekki-to, on bone loss in ovariectomized rats. In Vivo. 2001 Jan-Feb;15(1):25-8
[68] Hidaka S, Okamoto Y, Yamada Y, Kon Y, Kimura T. A Japanese herbal medicine, Chujo-to, has a beneficial effect on osteoporosis in rats. Phytother Res. 1999 Feb;13(1):14-9
[69] Gadzhieva RM, Portugalov SN, Paniushkin VV, Kondrat'eva II. A comparative study of the anabolic action of ecdysten, leveton and Prime Plus, preparations of plant origin. Eksp Klin Farmakol 1995, Sep-Oct; 58(5): p. 46-48.
[70] Logvinov SV, Pugachenko NV. At. Al.. Ischemia-induced changes in synaptoarchitectonics of brain cortex and their correction with ascovertin and Leuzea extract. Bull Exp Biol Med 2001. Oct;132(4):1017-1020.
[71] Lupandin, A.V., 1991, Adaptation and Rehabilitation in Sports, Khabarovsk: Institute of Physical Culture, Khabarovsk, USSR.
[72] Syrov, V.A., A. G. Kurmukov. "On the Anabolic Activity of Phytoecdisone-Ecdisterone Extracted from Rhaponticum Carthamoides." Journal "Farmakologiya and Toksikologiya" (Moscow) (Pharmacology and Toxicology), 39 (6), 1976, 690-693, Lab. Pharmoacol., Inst. Bot. Chem., Acad. Scien. Uzb. USSR, Tashkent, USSR.
[73] Hajdu Z, Varga E, Hohmann J, Kalman A, Argay G, Gunther G. A stilbene from the roots of leuzea carthamoides , J Nat Prod. 1998 Oct;61(10):1298-9.
[74] Kurmukov, AG, Ernishuna, OA, "The Influence of Ecdisterone on Experimental Arrhythmias, Changes in Hemodynamics and Cintractility of the Mycardium, Caused by Coronary Artery Occlusion," Farmakologia Toksikologia (Pharmacology and Toxicology), 54(1), 1992.
[75] Liu HD, Lin FS, Li E, Wu MS, Tong XX. The influence of the different components of nourishing kidney herbs on osteoporosis rats, *Zhongguo Zhong Yao Za Zhi*. 2003 Mar; 28(3):262-5
[76] Li, W.K. et al Research progress on Epimedium plants. World Note on Medicine and Pharmaceutics:Phytopharmaceuticals, 8, 147-154 (1993)
[77] Wang, Y.S. Pharmacology and applications of Chin. Mat. Med. Pp. 1102-81983
[78] Leung AY, Foster S. Encyclopedia of Common Natural Ingredients Used in Food, Drugs and Cosmetics. 2nd ed. New York, NY: John Wiley & Sons, 1996.

[79] Ye LC, Chen JM. Advances in study on pharmacological effects of Epimedium, *Zhongguo Zhong Yao Za Zhi*. 2001 May;26(5):293-5.
[80] Tan X, Weng W. Efficacy of epimedium compound pills in the treatment of the aged patients with kidney deficiency syndrome of ischemic cardio-cerebral vascular diseases*, Hunan Yi Ke Da Xue Xue Bao*. 1998;23(5):450-2.
[81] Cai, D., S. Shen, et al. (1998). "Clinical and experimental research of Epimedium brevicornum in relieving neuroendocrino-immunological effect inhibited by exogenous glucocorticoid." *Zhongguo Zhong Xi Yi Jie He Za Zhi* 18(1): 4-7
[82] Altamyshev A.A., Kortshubekow B.K. What we know about Mumie. Moscow, 1989.
[83] Suleimanov I. Effects of Mumie on bone regeneration in patients subjected to surgery for osteoarticular tuberculosis [Article in Russian] *Ortop Travmatol Protez*. 1972 Feb;33(2):64-6.
[84] Kel'ginbaev NS, Sorokina VA, Stefanidu AG, Ismailova VN., Treatment of long tubular bone fractures with Mumie Assil preparations in experiments and clinical conditions, *Eksp Khir Anesteziol*. 1973 Jul-Aug;18(4):31-5.
[85] Shakurov ASH. Effect of "mumie" on bone regeneration and blood alkaline phosphatase in experimental fractures of the tubular bones, *Ortop Travmatol Protez*. 1965 May;26:24-7.
[86] Tkachenko SS, Rutskii VV, Grachev IR., Reparative regeneration of the bone tissue under the effect of mumie-asyl, [Article in Russian] *Ortop Travmatol Protez*. 1979 Nov;(11):49-52.
[87] Tazhimametov BT, Usmanov MU, Dzhuraev KhA, Sharipov NI, Zul'fikarov Kh. Effect of mumie on the healing of suppurative wounds, *Klin Khir*. 1987;(1):51-2.
[88] Goel RK, Banerjee RS, Acharya SB. Antiulcerogenic and antiinflammatory studies with shilajit. *J Ethnopharmacol*. 1990 Apr;29(1):95-103.
[89] Kozlovskaia VI., Treatment of peripheral nervous system diseases with Caucasian mumie, [Article in Russian], *Vrach Delo*. 1968 Jun;6:88-92.
[90] Schliebs R; Liebmann A; Bhattacharya SK; Kumar A; Ghosal S; Bigl V Paul, Systemic administration of defined extracts from Withania somnifera (Ashwagandha) and Shilajit differentially affects cholinergic but not glutamatergic and GABAergic markers in rat brain. *Neurochem Int* 1997 Feb;30(2):181-90
[91] Tiwari P; Ramarao P; Ghosal S Effects of Shilajit on the development of tolerance to morphine in mice. *Phytother Res* 2001 Mar;15(2):177-9
[92] Adzhi-Mullaev, Nikadambaev S. Ju., The effect of mumija on the progression of radiation sickness in experiments. Proceedings of the 1st Interrepublican Symposium on experimental studies of mumija. Dushanbe, 1965
[93] Prasad, GE, Udupa KN. Effect of cissus quadrangularis on the healing of cortisone treated fractures. Indian j med res. 1963 jul;51:667-76.
[94] Chopra SS, Patel MR, Awadhiya RP. Studies of Cissus quadrangularis in experimental fracture repair : a histopathological study Indian J Med Res. 1976 Sep;64(9):1365-8
[95] Shirwaikar A, Khan S, Malini S. Antiosteoporotic effect of ethanol extract of Cissus quadrangularis Linn. on ovariectomized rat. J Ethnopharmacol. 2003 Dec;89(2-3):245-50.
[96] Chopra SS, Patel MR, Gupta LP, Datta IC. Studies on Cissus quadrangularis in experimental fracture repair: effect on chemical parameters in blood Indian J Med Res. 1975 Jun;63(6):824-8.
[97] Cissus extract during pregnancy of animals increased fetal bone growth during the intra-uterine developmental period.
[98] Potu BK, Rao MS, Kutty NG, Bhat KM, Chamallamudi MR, Nayak SR. Petroleum ether extract of Cissus quadrangularis (LINN) stimulates the growth of fetal bone during intra uterine developmental period: a morphometric analysis. Clinics. 2008 Dec;63(6):815-20.
[99] Parisuthiman D, Singhatanadgit W, Dechatiwongse T, Koontongkaew S. Cissus quadrangularis extract enhances biomineralization through up-regulation of MAPK-dependent alkaline phosphatase activity in osteoblasts. In Vitro Cell Dev Biol Anim. 2008 Dec 5
[100] Ishii R, Horie M, Murayama M, Maitani T. [Analysis of tetracyclines in honey and royal jelly by LC/MS/MS] Shokuhin Eiseigaku Zasshi. 2006 Dec;47(6):277-83. Japanese.
[101] Kohno K, Okamoto I, Sano O, Arai N, Iwaki K, Ikeda M, Kurimoto M. Royal jelly inhibits the production of proinflammatory cytokines by activated macrophages. *Biosci Biotechnol Biochem*. 2004 Jan;68(1):138-45.
[102] Okamoto I, Taniguchi Y, Kunikata T, Kohno K, Iwaki K, Ikeda M, Kurimoto M. Major royal jelly protein 3 modulates immune responses in vitro and in vivo. *Life Sci*. 2003 Sep 5;73(16):2029-45.
[103] Oka H; Emori Y; Kobayashi N; Hayashi Y; Nomoto K Suppression of allergic reactions by royal jelly in association with the restoration of macrophage function and the improvement of Th1/Th2 cell responses. *Int Immunopharmacol* 2001 Mar;1(3):521-32

[104] Wagner H; Dobler I; Thiem I, Effect of food-juice of the queen bee (royal jelly) on the peripheral blood and the survival rate of mice after whole body x-irradiation, Zur Wirkung von Waiselfuttersaft (Gelee Royal) auf das periphere Blut und die Uberlebensrate von Mausen nach Rontgenganzkorperbestrahlung. *Radiobiol Radiother* (Berl) 1970;11(3):323-8.
[105] Tamura T, Fujii A, Kuboyama N. Antitumor effects of royal jelly (RJ), *Nippon Yakurigaku Zasshi*. 1987 Feb;89(2):73-80.
[106] Bincoletto C, Eberlin S, Figueiredo CA, Luengo MB, Queiroz ML. Effects produced by Royal Jelly on haematopoiesis: relation with host resistance against Ehrlich ascites tumour challenge. Int Immunopharmacol. 2005 Apr;5(4):679-88.
[107] Kuratsu N, Isohama Y, Yamashita Y, Takei H, Tokuomi K, Inoue M, et al. A study on estrogen-like activity of royal jelly. *Proc Med Pharm Soci WAKAN-YAKU,* 2003;**20**(Suppl):161.
108 Inoue S, Koya-Miyata S, Ushio S, Iwaki K, Ikeda M, Kurimoto M. Royal Jelly prolongs the life span of C3H/HeJ mice: correlation with reduced DNA damage. *Exp Gerontol*. 2003 Sep;38(9):965-9.
[109] Vittek J, Slomiany BL. Testosterone in royal jelly. *Experientia.* 1984;**40**:104–6.
[110] Kamakura M; Mitani N; Fukuda T; Fukushima M Anti-fatigue effect of fresh royal jelly in mice. *J Nutr Sci Vitaminol* (Tokyo) 2001 Dec;47(6):394-401.
[111] Kuratsu N, Isohama Y, Yamashita Y, Takei H, Tokuomi K, Inoue M, et al. A study on estrogen-like activity of royal jelly. *Proc Med Pharm Soci WAKAN-YAKU,* 2003;**20**(Suppl):161. (in Japanese).
[112] Narita Y, Nomura J, Ohta S, Inoh Y, Suzuki KM, Araki Y, Okada S, Matsumoto I, Isohama Y, Abe K, Miyata T, Mishima S. Royal jelly stimulates bone formation: physiologic and nutrigenomic studies with mice and cell lines. Biosci Biotechnol Biochem. 2006 Oct;70(10):2508-14. Epub 2006 Oct 7.
[113] Hidaka S, Okamoto Y, Uchiyama S, Nakatsuma A, Hashimoto K, Ohnishi ST, Yamaguchi M. Royal jelly prevents osteoporosis in rats: beneficial effects in ovariectomy model and in bone tissue culture model. Evid Based Complement Alternat Med. 2006 Sep;3(3):339-48. Epub 2006 Apr 24.
[114] Koya-Miyata S, Okamoto I, Ushio S, Iwaki K, Ikeda M, Kurimoto M. Identification of a collagen production-promoting factor from an extract of royal jelly and its possible mechanism. *Biosci Biotechnol Biochem.* 2004 Apr;68(4):767-73.
[115] Kamakura M; Suenobu N; Fukushima M, Fifty-seven-kDa protein in royal jelly enhances proliferation of primary cultured rat hepatocytes and increases albumin production in the absence of serum. *Biochem Biophys Res Commun* 2001 Apr 13;282(4):865-74
[116] Husein MQ, Kridli RT., Reproductive responses following royal jelly treatment administered orally or intramuscularly into progesterone-treated Awassi ewes. *Anim Reprod Sci*. 2002 Nov 15;74(1-2):45-53.
[117] Pavlenko, S.M. (1988). Pantocrin: A Publication of Articles on Studies of Curative Properties of Pantocrin. Moscow, USSR: V/O Medexport.
[118] Duarte, A. (2000). *Velvet Deer Antler: The Ultimate Anti-Aging Supplement.* Grass Valley, CA: Nutri Tapes and Publications, Inc.
[119] Suttie, J.M. et al. (1985). "Insulin-like growth factor 1 (IGF-1) antler-stimulating hormone?" *Endocrinology;* 116(2): 846–8.
[120] Elliott, J.L. et al. (1992). "Presence of insulin-like growth factor-I receptors and absence of growth hormone receptors in the antler tip." *Endocrinology;* 130(5): 2513–20.
[121] Wang BX, Zhao XH, Qi SB *et al.* Stimulating effect of deer antler extract on protein synthesis in senescence-accelerated mice in vivo. Chemistry and Pharmacology Bulletin, 1988; 36(7): 2593-2598
[122] Ryashchenko (Editor) Russian book on Pantocrine, translation arranged by R. Archer, Properties of New Zealand deer velvet, 1983.
[123] Dobriyakov U. Antistress action of the remedy from Antlers, "Adaptation and Adaptogens," Vladivostok, 1977. Pg. 132-134.
[124] Fenessey P. Pharmacology of velvet. In: Proceedings of a Deer Course for Veterinarians. Queenstown, New Zealand, July 1989. The Deer Branch of the New Zealand Veterinary Association No. 6: 96-103.
[125] Kong YC, But PPH. Deer: The ultimate medicinal animal (antler and deer parts in medicine). In: Biology of Deer Production, The Royal Society of New Zealand Bulletin, 1985; 22: 311-324.
[126] Vali B, Rao LG, El-Sohemy A. Epigallocatechin-3-gallate increases the formation of mineralized bone nodules by human osteoblast-like cells. J Nutr Biochem. 2006 Sep 7
[127] Propping D, Bohnert KJ, et al: Vitex agnus-castus: Treatment of gynecological syndromes. Therapeutikon 5 (11): 581-5, 1991.
[128] Kunio Ohyamaa, Takenori Akaike, Masahiko Imai, Hiroo Toyoda, Chieko Hirobe, Toshio Bessho, Human gastric signet ring carcinoma (KATO-III) cell apoptosis induced by *Vitex agnus-castus* fruit extract through

intracellular oxidative stress, The International Journal of Biochemistry & Cell Biology 37 (2005) 1496–1510.
[129] Li WX, Cui CB, Cai B, Wang HY, Yao XS. Flavonoids from Vitex trifolia L. inhibit cell cycle progression at G2/M phase and induce apoptosis in mammalian cancer cells, Asian Nat Prod Res. 2005 Aug;7(4):615-26.
[130] Ko WG. Kang TH. Lee SJ. Kim YC. Lee BH. Rotundifuran, a labdane type diterpene from Vitex rotundifolia, induces apoptosis in human myeloid leukaemia cells. Phytotherapy Research. 15(6):535-7, 2001 Sep.
[131] Sehmisch S, Boeckhoff J, Wille J, Seidlova-Wuttke D, Rack T, Tezval M, Wuttke W, Stuermer KM, Stuermer EK. Vitex agnus castus as prophylaxis for osteopenia after orchidectomy in rats compared with estradiol and testosterone supplementation. Phytother Res. 2008 Dec 23.
[132] http://www.inspire.com/groups/national-osteoporosis-foundation/journal/is-strontium-useful-for-osteoporosis/1/26/2010
[133] Seeman E, Boonen S, Borgström F, Vellas B, Aquino JP, Semler J, Benhamou CL, Kaufman JM, Reginster JY. Bone. 2009 Dec 21. Five years treatment with strontium ranelate reduces vertebral and nonvertebral fractures and increases the number and quality of remaining life-years in women over 80 years of age.
[134] Possemiers S, Heyerick A, Robbens V, De Keukeleire D, Verstraete W. Activation of proestrogens from hops (Humulus lupulus L.) by intestinal microbiota; conversion of isoxanthohumol into 8-prenylnaringenin. J Agric Food Chem. 2005 Aug 10;53(16):6281-8.
[135] Sehmisch S, Hammer F, Christoffel J, Seidlova-Wuttke D, Tezval M, Wuttke W, Stuermer KM, Stuermer EK. Planta Med. Comparison of the phytohormones genistein, resveratrol and 8-prenylnaringenin as agents for preventing osteoporosis. 2008 Jun;74(8):794-801. Epub 2008 Jun 6.
[136] Possemiers S, Heyerick A, Robbens V, De Keukeleire D, Verstraete W. Activation of proestrogens from hops (Humulus lupulus L.) by intestinal microbiota; conversion of isoxanthohumol into 8-prenylnaringenin. J Agric Food Chem. 2005 Aug 10;53(16):6281-8.
[137] Bolca S, Possemiers S, Maervoet V, Huybrechts I, Heyerick A, Vervarcke S, Depypere H, De Keukeleire D, Bracke M, De Henauw S, Verstraete W, Van de Wiele T. Microbial and dietary factors associated with the 8-prenylnaringenin producer phenotype: a dietary intervention trial with fifty healthy post-menopausal Caucasian women. Br J Nutr. 2007 Nov;98(5):950-9. Epub 2007 May 23.
[138] Bowe J, Li XF, Kinsey-Jones J, Heyerick A, Brain S, Milligan S, O'Byrne K., The hop phytoestrogen, 8-prenylnaringenin, reverses the ovariectomy-induced rise in skin temperature in an animal model of menopausal hot flushes. J Endocrinol. 2006 Nov;191(2):399-405.
[139] Green J, Czanner G, Reeves G, Watson J, Wise L, Beral V. Oral bisphosphonates and risk of cancer of oesophagus, stomach, and colorectum: case-control analysis within a UK primary care cohort. BMJ. 2010 Sep 1;341:c4444. doi: 10.1136/bmj.c4444.
[140] Zhang Y, Li Q, Wan HY, Xiao HH, Lai WP, Yao XS, Wong MS. Study of the mechanisms by which Sambucus williamsii HANCE extract exert protective effects against ovariectomy-induced osteoporosis in vivo. Osteoporos Int. 2010 Apr 23
[141] Braux J, Velard F, Guillaume C, Bouthors S, Jallot E, Nedelec JM, Laurent-Maquin D, Laquerrière P. A new insight into the dissociating effect of strontium on bone resorption and formation. Acta Biomater. 2011 Feb 26.

Navigation Menu: Social Icons. Home Â» Nutrition Â» Dental Truths and Myths: Can you REALLY heal cavities? And more! Quiz: Are you in nutritional debt? Take the Quiz. Dental Truths and Myths: Can you REALLY heal cavities? And more!Â The dentistâ€™s solution for them at this point in their lives is to pull out their teeth and give them false teeth. Thatâ€™s not what they want to do. Their teeth are not that bad.Â These are simple and natural methods. Apart from it, another very powerful method is Baba Ramdevâ€™s Divya Dant Manjan. People may laugh, but that toothpowder is indeed very very powerful.