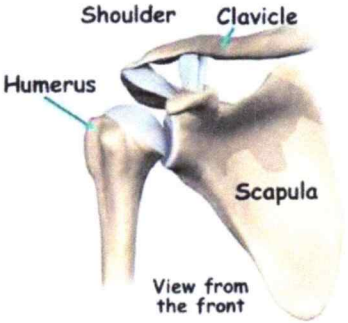
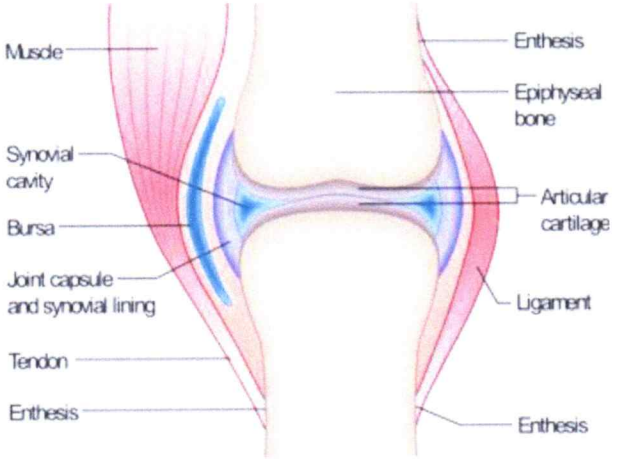
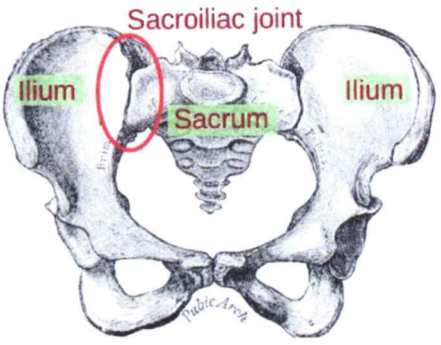
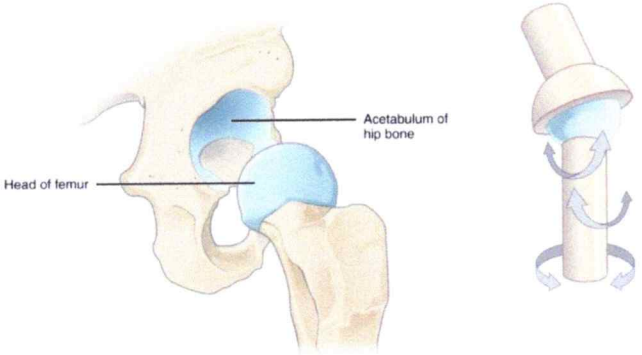
Osteoporosis, Osteoarthritis, and Bone Restoration Report



The shoulder joint







Integrity Research Institute

General Recommendations from IRI Staff

Jacqueline Panting N.D. and Thomas Valone PhD, PE

Don't forget to include motion (exercise, walking, working with weights as tolerated) and supplements (glucosamine, chondroitin, MSM, Calcium-Magnesium, hydrolyzed collagen, and gelatin-Jello) in your diet. Exercise and supplements together provide the nutrients needed for bones and joints AND allow the nutrients to get into the needed areas to rebuild tissue. We recommend **Joint Soother** from www.puritan.com as one of the best and most affordable vitamin companies (**Puritan's Pride**, 800-645-1030). **Joint Soother** (2 per day formula) has a triple strength glucosamine, chondroitin, and MSM combination that provides a noticeable different in mobility within only a few days! The standard combination would be recommended for **joint rebuilding** such as http://www.puritan.com/msm-products-031/triple-strength-glucosamine-chondroitin-msm-joint-soother-017895 . Make sure to take two (2) per day.

Another vitamin company, with a free magazine subscription, is the nonprofit **Life Extension**, and well researched products is www.LEF.org (Life Extension Foundation, 800-544-4440). LEF also has amazing *Wellness Specialists* available by phone 800-226-2370 from 9 AM to 1 AM ET, seven days a week! Ask them anything 😊.

Hip Pain and Stiffness

We would start with the inexpensive **Thigh Master** http://smile.amazon.com/s/ref=nb_sb_noss_1?url=search-alias%3Daps&field-keywords=thigh+master . This is important as a hip abductor to get nutrients back into the hip joints by exercising them. Keep in mind that ALL joints in the body have NO blood circulation! The only way they get nutrients is by putting the "body in motion". Weight bearing exercise is best to also open calcium channels in the bones and strengthen them. Even 20 jumping jacks twice daily has been shown to significantly strengthen the hip joints.

You can also add gelatin or **hydrolyzed collagen** tablets to help form cartilage too, also available from Puritan Pride www.puritan.com. The collagen should be taken on an empty stomach with water at least twice a day. It also helps maintain youthful skin!

KNEE CARTILAGE RESTORATION TO PAIN FREE STRENGTH

Thomas F. Valone, PhD, PE and Jacqueline Panting N.D.

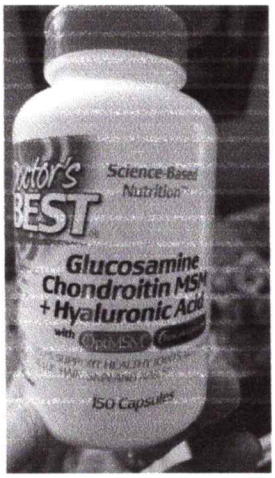
So your doctor has determined with X-rays and other scans that your knee cartilage is diminished to the point that it is painful to go up stairs and even get out of the car. I have been there, living in a house with no heat, after my electronics business went bankrupt during the Mid-East Iraq war for oil in 1990. Getting cold legs and knees during the winter, with no weight-bearing exercise, can precipitate a rapid, arthritic degradation of cartilage, as I found out the hard way. So I sympathize with those whose age-related cartilage loss creates the same condition as you get older.

Don't give up yet! After studying the problem, with painful knees, I joined a fitness center and we recommend that you do too. I also found out that knees, like every other joint in the body, need nutrients. However, since those *knees and other joints don't have a single blood vessel* to deliver the nutrients, they need weight-bearing exercise to deliver the nutrients and cause the cellular signals to open the calcium channels, since bones and cartilage are piezoelectric. Therefore, **leg lifts** (forward alternate foot lift up while sitting and lying on stomach, lift feet up backwards), as well as **deep knee bends** with weights, are the ticket to forcing nutrients into those knee joints. If you don't have access to a gym, then please purchase a couple of barbells, preferably the adjustable type like the DDFE Adjustable Dumbbell Barbell Lifting Set 40.4lb New Dumbbell Barbell Set for Men, Women, Beginners, Home or better yet for guys, the RitFit Adjustable Dumbbells Barbell Set with Comfortable Foam Connecting Rod, Home Fitness Free Weights for Men & Women that goes up to 82 lbs. If this is new to you and your knees are hurting a lot, then just doing 10 to 15 deep knee bends while holding onto a chair will be a big deal and still work the cartilage with body weight. Then a few days to a week later, repeat the process of 15 deep as you can go knee bends and see if you can do it without the chair. The first few will always hurt but as you keep doing the full 15 reps, the pain will subside, thus proving that nutrients are getting in. Then you are ready to start holding onto barbells like the DDFE or RitFit above, with say, two 3 lb. weights, with straight arms as you do your deep knee bends each week or preferably twice a week. Then work up to 20 lb. weights in each hand, which is what we use. Leg lifts are done sitting in a chair, with or without any ankle weights added.

Another recommended therapy as winter approaches is when your knees feel cold, which they may do, compared to the rest of your body. This is a temporary syndrome that will pass if you treat the knees kindly with extra layers, long john underpants, or woolen pants and lighter layers on the upper part of the body. I particularly found to survive the winter when my knee pain was the worst, that keeping the legs warm and relinquishing the tendency to wear sweaters, ensured that my body was generating heat to the legs and knees. Taking Epsom salt

baths is also a great way to feed the knees the magnesium they are deficient in and warming them up for days afterwards!

In addition, it is worth trying our **OsteoPad** during the day or all night. Lots of testimonials online confirm the value of our toroidal magnetic field design with a nanosecond rise time pulse combined with the Schumann frequency pulse rate. We also recommend that you take NeoCell super collagen powder every day, along with a joint supplement like Osteo Bi-Flex as well, so the signal triggering the cellular channels will have nutrients to bring in. We also rub a multi-content joint cream like Alflexil into sore joints such as the knees, as needed, which feeds that cartilage as well. Also, a calcium-magnesium-Zinc supplement on a daily basis along with a good Vitamin D3 source is also very helpful internally, which will build cartilage as well. Lastly, 2/3 of adults in the world are magnesium deficient, according to doctors (including our favorite Norm Shealy, MD, PhD). Therefore, using a Magnesium Oil Spray daily after showering, on the knees and legs, is essential for absorbing the missing nutrient through the skin, since magnesium does not absorb well any other way, according to Dr. Shealy (his DVD lecture available on request).



Remember, bone AND cartilage are both piezoelectric, meaning that weight and force application will create electrical impulses in them which opens their calcium channels 😊. If you are not using an electrotherapy device or even if you are, a weight-bearing exercise routine is vital to restoring joints and bones.

Below is a portable, miniature bicycle device for exercising the legs and knees, if you don't use a regular bicycle often. It is available from Amazon.

I have also learned that even magnesium oil will create a nice relaxation for both muscles and joints, besides being an important electrolyte. Our EM Pulser or OsteoPad will do wonders for you, along with once a week fasting on water and juice to detox the deposited minerals in the knees and joints. We consistently feel less joint pain and irritation after fasting on Sundays.

Also, don't forget to stretch, exercise, and sit cross-legged for a while as tolerated, and also put one leg in the opposite direction, behind you to stretch the hip joint in the opposite direction before bed. We also have a complimentary "Power Yoga" DVD available which we videotaped in a fitness gym before COVID hit. It has been a life saver for us and we still do the entire class (half two days in a row most often) once a week faithfully.

Please Note: All of the blue underlined links on these pages go to Amazon.com for convenience.

This new discovery from NASA confirms our BioenergyDevice.org Schumann Resonance 7.8 Hz PEMF ability to restore cartilage with a fast nanosecond rise time (slew rate) circuitry, available on the EM Pulser 78, the OsteoPad, and also our MaxiMat.

Noninvasive Therapy for Cartilage Regeneration

A device that can alleviate cartilage degradation in synovial joints by promoting the growth of new cartilage.

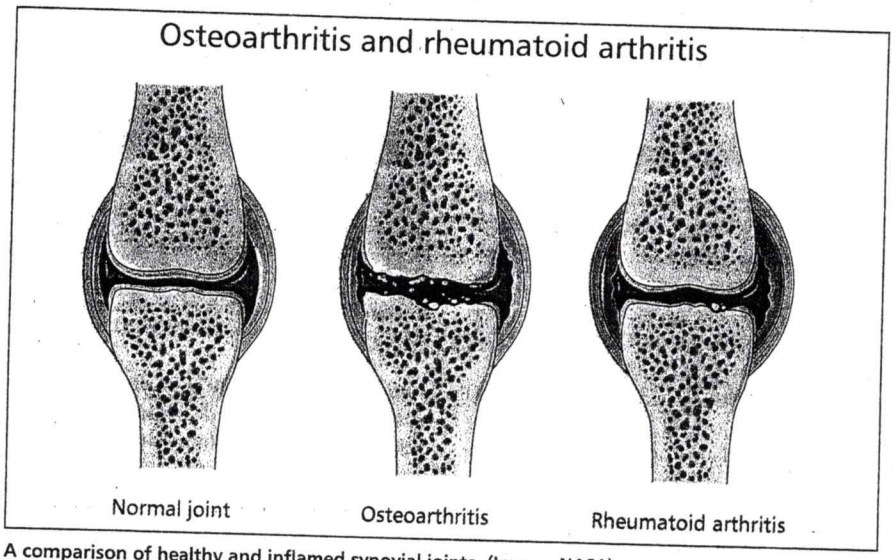
Johnson Space Center, Houston, TX

Innovators at NASA Johnson Space Center researching time-variance magnetic field (TVMF) therapies have developed a pulsed electromagnetic field (PEMF) device that can alleviate cartilage degradation in synovial joints by promoting the growth of new cartilage.

Joint disorders result in intense pain. Noninvasive and painless regeneration of a patients own tissue offers fewer side-effects than surgical joint replacement or tissue engineering procedures. The PEMF device could be wrapped around synovial joints where cartilage-degrading inflammation is located.

In initial studies, cultured human chondrocyte cells (HCH) from patients with early-stage osteoarthritis were exposed to PEMF stimulation using a variety of tuned electro-magnetic pulse characteristics such as flux magnitude, slew rates, rise and fall times, frequency, wavelength, and duty cycle. Waveforms used in testing were monophasic, bi-phasic, square, sinusoidal, and triangular in nature.

Frequencies were generally low, ranging from 6-500 Hz, and the waveforms used high rising and falling slew rates on the order of Tesla/sec, promoting pulses or bursts. Cellular catabolic and anabolic gene expression analyses comprised of fold-change were accomplished by a survey of 47,000 human genes using an AFFYMETRIX Gene Array.



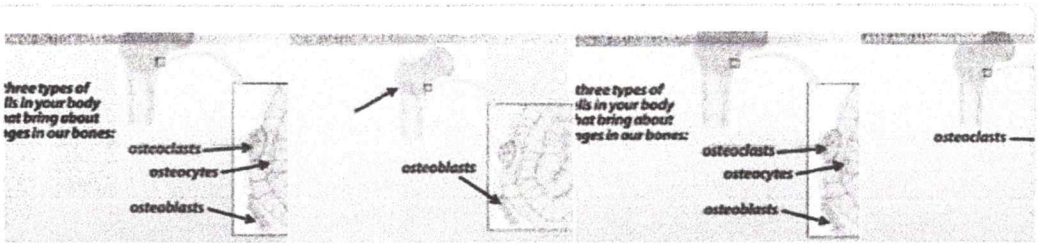
A comparison of healthy and inflamed synovial joints. (Image: NASA)

Results show that variation of waveform used in PEMF therapies, independent of flux intensity, influences genetic regulation of HCH from patients with early-stage osteoarthritis. The device has potential to be used in the treatment of cartilage degenerative joint disorders in patients resulting from rheumatism, trauma, or surgery.

NASA is actively seeking licensees to commercialize this technology. Please contact NASA's Licensing Concierge at Agency-Patent-Licensing@mail.nasa.gov or call at 202-358-7432 to initiate licensing discussions. For more information, visit https://technology.nasa.gov/patent/MSC-TOPS-96.

Vital discovery that 15 Hz PEMF affects the proliferation rate of osteoblasts.

This is a first harmonic of our new 7.8 Hz Schumann resonance pulse rate OsteoPad and MaxiMats, so this article below implies that such PEMF will increase bone strengthening and density by activating osteoblasts. NOTE: where you see "bone healing" it also implies "bone regeneration" from the osteoblasts that perform that service in your body. (IRI paid $42 to buy and download a PDF of this article and will send you a copy upon request.) - TV



OSTEOBLASTS are the cells that form new bone. They also come from the bone marrow and are related to structural cells. They have only one nucleus. **Osteoblasts** work in teams to build bone. They produce new bone called "osteoid" which is made of bone collagen and other protein.

depts.washington.edu › bonebio › bonAbout › bonecells

Bone Cells

› Bioelectromagnetics. 2009 Apr;30(3):189-97. doi: 10.1002/bem.20459.

Osteoblasts stimulated with pulsed electromagnetic fields increase HUVEC proliferation via a VEGF-A independent mechanism

Richard A Hopper [1], Jon P VerHalen, Oren Tepper, Babek J Mehrara, Robert Detch, Edward I Chang, Samuel Baharestani, Bruce J Simon, Geoffrey C Gurtner

Affiliations + expand

PMID: 19194859 DOI: 10.1002/bem.20459

Abstract

The clinically beneficial effect of low frequency pulsed electromagnetic fields (ELF-PEMF) on bone healing has been described, but the exact mechanism of action remains unclear. A recent study suggests that there is a direct autocrine mitogenic effect of ELF-PEMF on angiogenesis. The hypothesis of this study is that ELF-PEMF also has an indirect effect on angiogenesis by manipulation of vascular endothelial growth factor (VEGF)-A-based paracrine intercellular communication with neighboring osteoblasts. Conditioned media experiments measured fetal rat calvarial cell (FRC) and human umbilical vein endothelial cell (HUVEC) proliferation using tritiated thymidine uptake. We demonstrate that ELF-PEMF (15 Hz, 1.8 mT, for 8 h) has an indirect effect on the proliferation rate of both endothelial cells and osteoblasts in vitro by altering paracrine mediators. Conditioned media from osteoblast cells stimulated with ELF-PEMF increased endothelial proliferation 54-fold, whereas media from endothelial cells stimulated with ELF-PEMF did not affect osteoblast proliferation. We examined the role of the pro-angiogenic mediator VEGF-A in the mitogenic effect of ELF-PEMF-stimulated osteoblast media on endothelial cells. The production of VEGF-A by FRC as measured by ELISA was not changed by exposure to PEMF, and blocking experiments demonstrated that the ELF-PEMF-induced osteoblast-derived endothelial mitogen observed in these studies was not VEGF-A, but some other soluble angiogenic mediator.

5 Katsika D, Grjibovski A, Einarsson C, Lammert F, Lichtenstein P, Marschall HU. Genetic and environmental influences on symptomatic gallstone disease: a Swedish study of 43 141 twin pairs. *Hepatology* 2005;41:1138-43.
6 Glasgow RE, Cho M, Hutter MM, Mulvihill SJ. The spectrum and cost of complicated gallstone disease in California. *Arch Surg* 2000;135:1021-5.
7 Karani J, Sutton D. *Textbook of radiology and imaging*. Oxford: Churchill Livingstone, 2003:715.
8 Venneman NG, Buskens E, Besselink MG, Stads S, Go PM, Bosscha K, et al. Small gallstones are associated with increased risk of acute pancreatitis: potential benefits of prophylactic cholecystectomy? *Am J Gastroenterol* 2005;100:2540-50.
9 Miller K, Hell E, Lang B, Lengauer E. Gallstone formation prophylaxis after gastric restrictive procedures for weight loss: a randomized double-blind placebo-controlled trial. *Ann Surg* 2003;238:697-702.
10 Venneman NG, Besselink MG, Keulemans YC, Vanberge-Henegouwen GP, Boermeester MA, Broeders IA, et al. Ursodeoxycholic acid exerts no beneficial effect in patients with symptomatic gallstones awaiting cholecystectomy. *Hepatology* 2006;43:1276-83.
11 Spira RM, Nissan A, Zamir O, Cohen T, Fields SI, Freund HR. Percutaneous transhepatic cholecystostomy and delayed laparoscopic cholecystectomy in critically ill patients with acute calculus cholecystitis. *Am J Surg* 2002;183:62-6.
12 Keus F, de Jong JA, Gooszen HG, van Laarhoven CJ. Laparoscopic versus small-incision cholecystectomy for patients with symptomatic cholecystolithiasis. *Cochrane Database Syst Rev* 2006;(4): CD006229.
13 Harju J, Juvonen P, Eskelinen M, Miettinen P, Paakkonen M. Minilaparotomy cholecystectomy versus laparoscopic cholecystectomy: a randomized study with special reference to obesity. *Surg Endosc* 2006;20:583-6.
14 Ros A, Nilsson E. Abdominal pain and patient overall and cosmetic satisfaction one year after cholecystectomy: outcome of a randomized trial comparing laparoscopic and minilaparotomy cholecystectomy. *Scand J Gastroenterol* 2004;39:773-7.
15 Johansson M, Thune A, Nelvin L, Lundell L. Randomized clinical trial of day-care versus overnight-stay laparoscopic cholecystectomy. *Br J Surg* 2006;93:40-5.
16 Leeder PC, Matthews T, Krzeminska K, Dehn TC. Routine day-case laparoscopic cholecystectomy. *Br J Surg* 2004;91:312-6.
17 Gurusamy KS, Samraj K. Early versus delayed laparoscopic cholecystectomy for acute cholecystitis. *Cochrane Database Syst Rev* 2006;(4):CD005440.
18 Cheruvu CV, Eyre-Brook IA. Consequences of prolonged wait before gallbladder surgery. *Ann R Coll Surg Engl* 2002;84:20-2.
19 Mercer SJ, Knight JS, Toh SK, Walters AM, Sadek SA, Somers SS. Implementation of a specialist-led service for the management of acute gallstone disease. *Br J Surg* 2004;91:504-8.
20 Park PO, Bergstrom M, Ikeda K, Fritscher-Ravens A, Swain P. Experimental studies of transgastric gallbladder surgery: cholecystectomy and cholecystogastric anastomosis (videos). *Gastrointest Endosc* 2005;61:601-6.
21 Rattner D, Kalloo A. ASGE/SAGES Working Group on Natural Orifice Translumenal Endoscopic Surgery. October 2005. *Surg Endosc* 2006;20:329-33.

BMJ UPDATES

Soy phytoestrogen genistein increases bone mineral density in postmenopausal women

Research question

Can genistein reduce bone loss in osteopenic postmenopausal women?

Answer

Yes, but it's still unclear whether genistein helps prevent fractures.

Why did the authors do the study?

Small, brief trials suggest that the phytoestrogen genistein, found in many soy products, can help prevent bone loss after the menopause. These authors wanted to extend and confirm these preliminary findings.

What did they do?

389 Italian women took part in a double blind, randomised, controlled trial. All were postmenopausal and had osteopenia (with a bone mineral density at the femoral neck of <0.795 g/cm^2) but were otherwise well. After randomisation, 198 women took a pill containing 54 mg genistein daily for two years. The rest took a matching placebo. Both pills contained calcium and vitamin D. All the women ate a low fat diet designed to meet their daily energy requirements.

The authors were particularly interested in the effects of genistein on bone mineral density at the femoral neck and lumbar spine, which they measured at baseline and then after one and two years. They also looked for changes in urinary markers of bone resorption and serum markers of bone formation and growth. They asked women about menopausal symptoms and side effects every three months, and measured endometrial thickness before and after treatment to asses the effects of genistein on the uterus. Their study was powerful enough to detect a difference in bone mineral density of at least 20% between the two groups after two years. The authors used intention to treat analysis to compare groups.

What did they find?

Bone mineral density increased among the women taking genistein and decreased among those taking placebo, leading to a difference at two years of 0.10 g/cm^2 (95% CI 0.08 to 0.12, P<0.001) at the lumbar spine and 0.062 g/cm^2 (0.049 to 0.073, P<0.001) at the femoral neck. Compared with placebo, genistein increased serum concentrations of bone specific alkaline phosphatase and insulin-like growth factor 1 (both serum markers of bone formation) and decreased urinary excretion of pyridinoline and deoxypyridinoline (markers of bone resorption). It had no measurable effect on endometrial thickness.

Women taking genistein reported significantly fewer hot flushes than controls (mean 1.7 per day *v* 3.9 per day, P<0.001), but they had more gastrointestinal side effects and were more likely to drop out of the study early (19% *v* 8%). Constipation (13/198, 7%) and dyspepsia (9/198, 5%) were the commonest side effects associated with genistein.

What does it mean?

Genistein, an isoflavone phytoestrogen, seems to have positive effects on bone mineral density and bone turnover in osteopenic women who are at least one year past the menopause. But about one in five women in this trial stopped their treatment early, so gastrointestinal side effects may be a problem.

Although these data look encouraging, the authors looked only at surrogate measures of effectiveness and safety. Bigger trials are now required with the power to find out if genistein can reduce the risk of osteoporotic fractures without increasing women's risk of uterine cancer.

Marini et al. Effects of the phytoestrogen genistein on bone metabolism in osteopenic postmenopausal women: a randomized trial. *Ann Intern Med* 2007;146:839-47

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Tom Valone

From: Life Extension <news@emails.lifeextension.com>
Sent: Tuesday, February 8, 2022 12:04 AM
To: iri@erols.com
Subject: Check your bone health regimen for THIS ingredient

LIFE EXTENSION®

The Science of a Healthier Life®

Postmenopausal women who increased intake of collagen peptides demonstrated improved bone mineral density, study finds

A randomized trial reported on November 25, 2021 in the *Journal of Clinical Densitometry* found that the addition of collagen peptides to a standard bone-supporting regimen of calcium and vitamin D3 was associated with greater improvements in measures of bone health compared to calcium and vitamin D3 alone.[1]

Read More

Featured Products

The Little-Known Link Between **Bone Health** and **Total Health**

BY RON PEREZ

Scientists at the leading edge of ***osteology*** (bone research) are discovering that in addition to **immune strength**, **blood cell production**, and **nervous system function**, a healthy skeletal system is also essential to **insulin sensitivity**, **energy metabolism**, and **weight management**.[1-4]

The common bone disease osteoporosis accounts for **2.6 million** doctors' office visits and **180,000** placements in nursing homes across the country each year. According to the Surgeon General, by 2020 this potentially life-changing condition will afflict nearly *half* of all Americans over 50.[5]

Behind this alarming trend lies an even greater threat to the public health most doctors don't know about. It turns out that strong, healthy bones play a far greater role in *overall* health than previously known.

In this article, the most recent data on these findings are detailed. You will also discover how **calcium**, **magnesium**, and **potassium**, along with **vitamins D3** and **K**, act to *optimize* these functions for bone strength and system-wide health. > >

Bone Restore combines critical **bone boosting** nutrients into one **superior formula.**

Bone Restore includes highly ***absorbable*** forms of **calcium** and **boron,** along with **vitamin D3, magnesium, zinc, manganese**, and **silicon. Bone Restore** is available with or without **vitamin K2** (MK-7).

Bone Restore now contains **300 mg** of **magnesium.**

The retail price for 120 capsules of **Bone Restore** is $24. If a member buys four bottles during **Super Sale**, the price is reduced to **$14.85** per bottle. **(Item# 01727)**

The same **Bone Restore** formula without vitamin K2 (MK-7) is available as well. The retail price for 120 capsules is $22. If a member buys four bottles during **Super Sale**, the price is reduced to **$12.83** per bottle. **(Item# 01726)**

Note: Those who take **Super Booster** or **Super K** usually do not need additional vitamin K2. They should order **Bone Restore** without **vitamin K2.** Those taking the anti-coagulant drug **Coumadin®** (warfarin) should use **BONE RESTORE** without **vitamin K2.**

Just four capsules of Bone Restore provide:

Highly Absorbable Calcium (as DimaCal® dicalcium malate, TRAACS® calcium bisglycinate chelate, calcium fructoborate)	**700 mg**
Vitamin D3	**1,000 IU**
Vitamin K2 (as menaquinone-7)	**200 mcg**
Magnesium (as magnesium oxide)	**300 mg**
Boron (calcium fructoborate as patented FruiteX B® OsteoBoron®)	**3 mg**
Zinc (as zinc amino acid chelate)	**2 mg**
Manganese (as amino acid chelate)	**1 mg**
Silicon (from horsetail extract)	**5 mg**

Fruitex B® and OsteoBoron® are registered trademarks of VDF Futureceuticals, Inc. U.S. patent #5,962,049.

DimaCal® and TRAACS® are registered trademarks of Albion Laboratories, Inc. Malate is covered by U.S. Patent 6,706,904 and patents pending.

To order Bone Restore, call 1-800-544-4440 or visit www.LifeExtension.com

These statements have not been evaluated by the Food and Drug Administration. These products are not intended to diagnose, treat, cure, or prevent any disease.

Until recently, the human skeleton was known to serve three basic functions.[6] The first was its role in providing structural support for muscles and protection for internal organs.[6] The second was its function as a reservoir for important mineral ions, especially calcium and magnesium, which are vital to nerve and muscle cell functioning and electrical conduction.[6-8] Finally, the marrow space of many bones harbors all of the body's blood-producing tissues and a major part of the cellular immune system.[6]

Just five years ago, however, scientists discovered a fourth, unexpected function.[1] Bone-forming cells called ***osteoblasts*** were found to produce a hormone-like signaling protein called **osteocalcin**.[9] It was further revealed that osteocalcin stimulates pancreatic insulin secretion and improves insulin sensitivity in tissues throughout the body.[1,2,10-12]

Osteocalcin reduces fat tissue deposition,[2] while higher osteocalcin levels are associated with lower levels of **leptin**.[13] As you read next, suppressing excess leptin is important in weight management.

Sometimes called the "hunger hormone," **leptin** induces the feeling of being full after a meal. It plays a key role in regulating energy intake and energy expenditure, including appetite and metabolism. Higher leptin levels are paradoxically detrimental; as with insulin, you can develop ***leptin resistance*** that keeps you from feeling full. Obese individuals exhibit this resistance.[14] Pathologically elevated leptin levels are detrimental to multiple tissues in the body and correlate with **insulin resistance**, **inflammation**, **stroke**, **hypertension**, and other dangerous health conditions.[2,15-17]

High leptin levels also exert an adverse effect over osteocalcin function:[18] the more leptin your body's fatty tissue produces, the less osteocalcin your bone cells release, and the worse your insulin resistance becomes.[3] And in a final unexpected discovery, leptin achieves that effect by *suppressing* your osteoblasts' activity, decreasing your ability to build new bone, and threatening your bone health.[18]

An additional indicator of how good bone health affects longevity is the now well-understood relationship between skeletal health and **atherosclerosis**.[19] Via a variety of mechanisms, as calcium leaves the bones in the process of osteoporosis, it builds up instead in blood vessel walls, leading to dangerous calcified plaque deposits.[20,21] Those deposits can rupture, causing an immediate arterial blockage and producing a sudden heart attack or catastrophic stroke.

It is this close interrelationship between bone health and total body health that has intensified scientific interest in identifying nutritional strategies to optimize bone health and strength.[1]

Most doctors don't know about these new findings. ınd most Americans, including many health-conscious individuals, don't get enough of the nutrients hey need to support healthy bones. Adequate bone ıutrition hinges on the following group of nutrients hat work *synergistically* to optimize skeletal health ınd ward off multiple diseases of aging.[22-24]

Calcium

Calcium accounts for 1-2% of adult human body weight, with more than 99% of total body calcium residing in the teeth and bones.[25] The remaining 1% is used in our electrically active tissues such as nerve and muscle, where it plays a vital signaling role. Thus the skeleton is the body's only storehouse of the calcium we need to sustain life itself, yet as we age we see a progressive decrease in the amount of calcium in our bones.[25] Consuming a readily-absorbed form of calcium, then, is essential for restocking that reservoir—but many people do not ingest adequate amounts of calcium.[25]

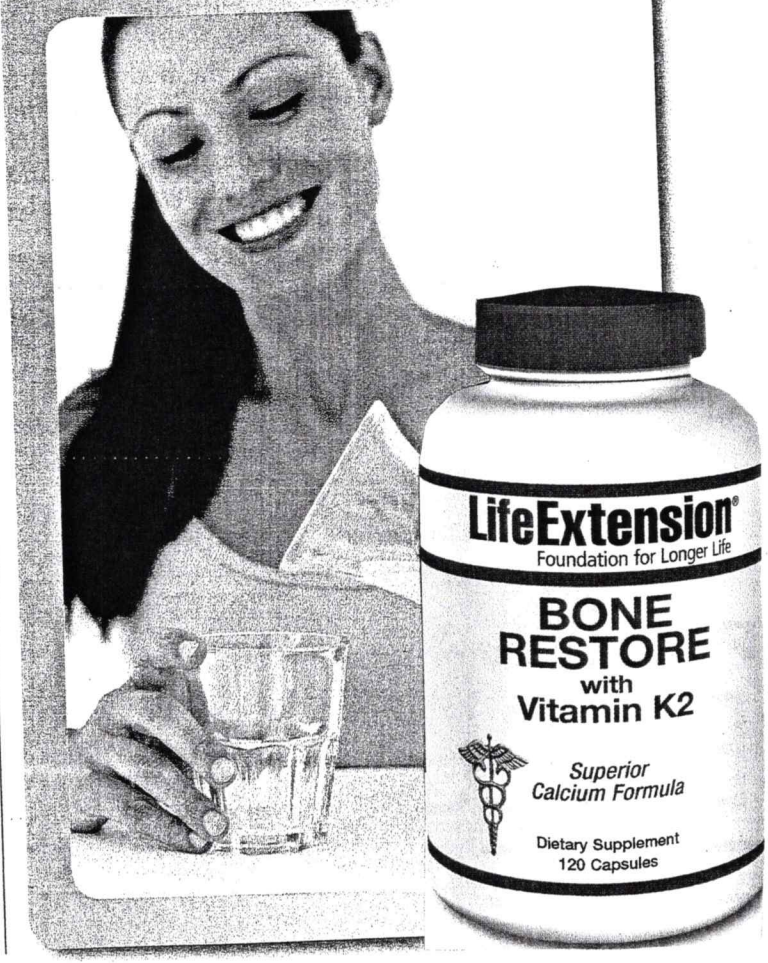
The mainstream medical establishment has stubbornly denied the value of calcium supplementation for years, arguing that human studies under controlled conditions were inconclusive.[26] A more careful and detailed review of recent studies, however, reveals flaws in their conclusions. Most notably, in outpatient studies, patients' adherence to the supplementation regimen was generally poor—in other words, participants weren't actually taking the calcium doses that researchers thought they were.[26] A recent re-analysis of five of those flawed studies showed that patients who took the required doses of supplements indeed had significant reductions in osteoporosis fracture risk.[26] Studies designed to optimize patients' adherence to supplementation regimens have also demonstrated improved bone health and reduced risk of fracture.[22,27,28]

Not all calcium is alike. Dicalcium malate is an especially rich source of elemental calcium since it is comprised of two calcium molecules attached to each malic acid molecule. In a study of calcium absorption in humans, dicalcium malate demonstrated the longest half-life and greatest bioavailability, compared to several other forms of calcium.[29] Calcium bis-glycinate consists of calcium chelated to the amino acid glycine, which allows it to be easily absorbed and utilized by the body. Both dicalcium malate and calcium bis-glycinate are easily assimilated, well tolerated, and effective at improving bone mineral density, an important measure of bone health.[30] These mineral formulations represent outstanding forms of calcium for those seeking to optimize their bone health.

What You Need to Know

The Link Between Bone Health and Total Health

- Nearly *half* of all Americans over 50 will suffer from osteoporosis by the year 2020.
- Osteoporosis is only one of the consequences of inadequate bone nutrition.
- Medical researchers have recently discovered conclusive links between bone health and system-wide health.
- The most recent research reveals that weak bones contribute to increased fat mass, decreased insulin sensitivity, inflammation, and greater risk of cardiovascular disease.
- While most maturing individuals know of calcium's importance for healthy bones, many remain unenlightened of the critical need for vitamin D3, vitamin K, magnesium, potassium, and boron.



Daily doses averaging **1,000 mg** are recommended for adults. For older women, the recommendation is **1,200 mg** daily.[31] Higher doses don't provide additional benefit, and doses greater than **3,000 mg** per day may be associated with kidney stones and other undesirable outcomes.[32]

Vitamin D3

In order to absorb calcium from the diet or from supplements, the human body requires vitamin D. For years, we believed that promoting calcium absorption from the intestinal tract was the chief function of vitamin D.[33] But over the past decade there has been an explosion of scientific discoveries about vitamin D's multiple roles throughout the body.[34] We now recognize that vitamin D functions as a hormone, with receptors located in at least 35 different tissue types.[34,35] That means the body's overall requirement for vitamin D is much greater than we originally realized.[33,36]

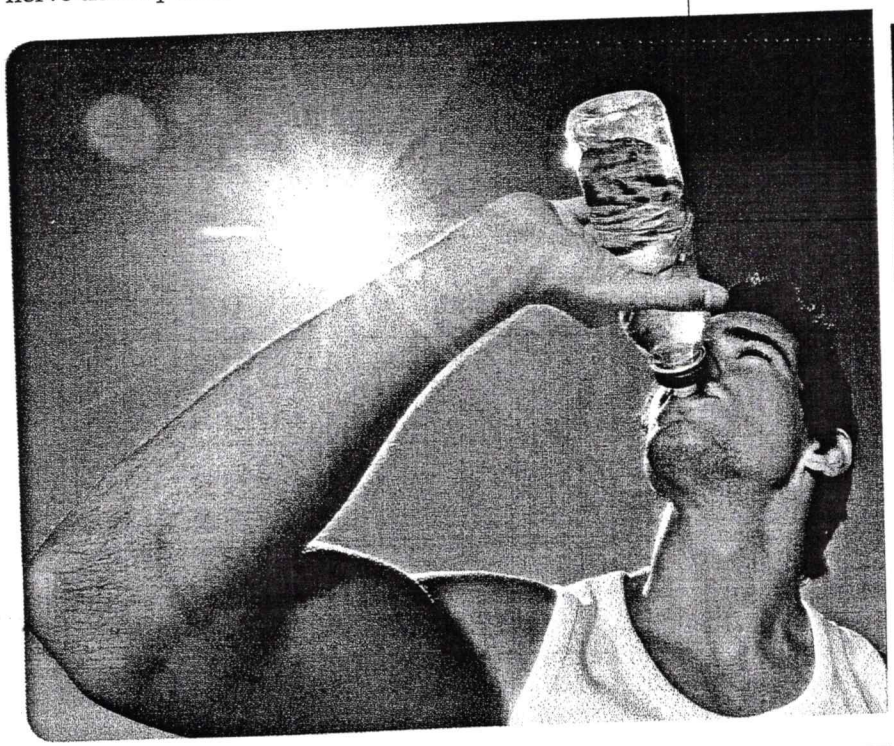
With regard to bone health, vitamin D not only promotes calcium absorption but also its proper deposition in bone tissue, where it helps maintain the skeleton's basic function as scaffold and protector of soft tissues.[37] Elsewhere in the body, vitamin D acts at its specific receptors to promote immune function, subdue inflammation, reduce arterial calcification, enhance cardiac function, improve brain and nerve tissue performance, and even prevent cancer by regulating the cell replication cycle.[34,38,39] Conversely, vitamin D deficiency is associated with not only bone diseases, but also cardiovascular disease, the metabolic syndrome, cancer, immune suppression, and autoimmune conditions such as multiple sclerosis, lupus, and inflammatory bowel disease.[37,39-42]

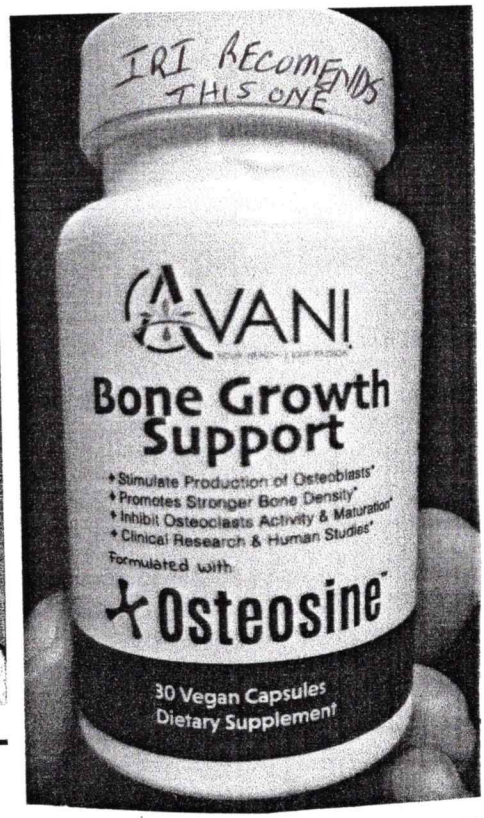
Despite the renewed scientific interest in vitamin D's impact on human health, the prevalence of vitamin D deficiency remains high.[43] Vitamin D3 (***cholecalciferol***) is synthesized in the skin from sunlight exposure and then converted into the active form, 1,25-dihydroxyvitamin D (***calcitriol***), by the liver and kidneys.[37] But even in sunny Southern California, where one would expect most people to have sufficient vitamin D levels, almost **20%** of people in one study had low vitamin D3 levels in their blood.[44] In less sun-exposed regions, deficiency rates in excess of 50% have been documented.[35,45]

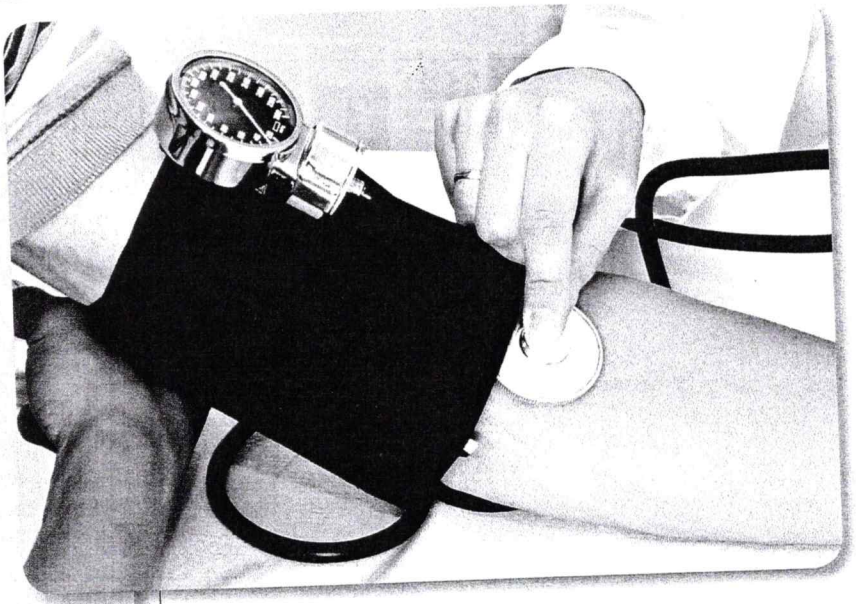
And remember that "deficiency" means exceedingly low levels of vitamin D. In aging individuals who don't take at least 5,000 IU per day of vitamin D, approximately 85% have insufficient or "less-than-optimal" blood levels of vitamin D (measured as 25-hydroxyvitamin D).[46]

The combination of our increased knowledge about the importance of vitamin D throughout the body, and the widespread lack of adequate levels, has resulted in a rapidly growing international call for increased vitamin D intake.[33,45,47]

Many experts in the field recommend supplementing with doses of **2,000-10,000 IU** per day in order







Vitamin K2–Extra Nutrition for Optimal Bone Health

Attention to the importance of vitamin K2 in supporting bone health has grown over the past decade. It works alongside vitamin D3 to keep calcium in bones where it belongs and out of arterial walls where it does not.[67,68] Vitamin K2 reduces production of bone-absorbing cells (*osteoclasts*) and promotes development of bone-forming cells (*osteoblasts*).[69,70] Vitamin K2 is required for production of a small family of proteins that include the bone matrix proteins and the essential bone-produced hormone called osteocalcin.[35,71]

Healthy bone matrix proteins hold tightly to calcium and maintain bone's integrity and strength, reducing your risk of osteoporosis. And ample supplies of osteocalcin directly improve insulin sensitivity, reduce fat accumulation, and are associated with lower levels of leptin, a fat-produced hormone that's implicated in the metabolic syndrome.[13,18]

Vitamin K2 increases osteocalcin production and improves bone mineral density, and may protect against fracture risk.[72-76]

NOTE: If you are taking any form of the anticoagulant medication Coumadin® (*warfarin*), consult with your prescribing physician before increasing your vitamin K intake. While large quantities of vitamin K may reduce the medication's efficacy, low-dose vitamin K (100 mcg/day) may increase the stability of anticoagulant therapy, as measured by less fluctuation in international normalized ratio (INR) values.[77,78]

to achieve optimal total-body vitamin D status for optimal skeletal, cardiovascular, neurological, immunological, and metabolic health.[45,48-50]

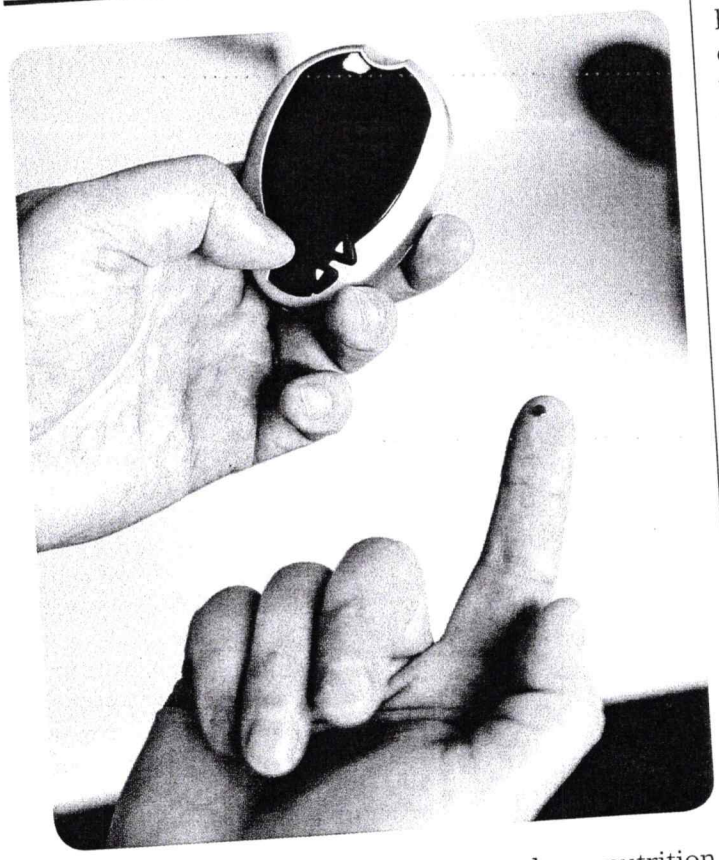
Magnesium

While calcium and vitamin D have been considered the mainstays of bone nutrition and osteoporosis prevention, several other minerals are also essential to good bone health.[51,52] Magnesium is an element that is involved in more than 300 essential metabolic reactions. Magnesium is also vital to human nerve and muscle cell function. Fully one-half to two-thirds of the total body content of magnesium is stored in bone—another example of the skeleton's substantial role as reservoir for important minerals.[53,54] While blood levels of magnesium remain virtually constant throughout life, the total body content diminishes with aging, leading to depletion of the skeletal stores.[55] Magnesium deficiency is therefore common among older adults, who typically consume inadequate amounts of magnesium-rich foods and whose physiology may contribute to increased losses of the element from the body.[55]

Magnesium deficiency is a risk factor for osteoporosis and is also associated with a long list of other chronic ailments, many of which are themselves age-related. These include virtually all forms of cardiovascular disease, insulin resistance and diabetes, lipid disturbances, increased inflammation and oxidative stress, asthma, chronic fatigue, and depression.[55]

Plentiful consumption of magnesium is an important part of good bone nutrition. Higher dietary intakes are associated with higher bone mineral density.[53,54,56,57] While the mechanisms of this effect are not entirely clear, it is known that magnesium supports a more alkaline environment in bone and other tissues, which helps to reduce calcium losses in the urine.[51,56] Magnesium also reduces markers of excessive bone turnover, helping bones retain their vital mineral mass.[58]

Increasing magnesium intake improves bone mineral density and bone strength in both animal and human studies.[57,59] Conversely, magnesium deficiency may impair the beneficial effects of calcium supplements. In magnesium-deficient rats, calcium supplements suppressed bone formation, a worrisome finding.[60] That study serves as an important reminder,



of the importance of comprehensive bone nutrition that includes more than simply calcium and vitamin D.[51] Simultaneously increasing calcium and magnesium intake helps promote a favorable change in cytokines that can promote bone formation.[61]

Potassium

Potassium is one of the predominant ions in the human body, and it is essential to maintaining health at the cellular level. Even apparently minor potassium disturbances can produce significant cardiovascular disorders. Americans consume an average of only 2,600 mg of potassium daily, compared with the 4,700 mg recommended by the USDA's Center for Nutrition Policy and Promotion.[62] Older adults are at substantially increased risk for having low potassium levels, in part because of lower dietary consumption of potassium-rich fruits and vegetables and also because of the side effects of many common medications such as certain diuretics like ***furosemide***, thiazides such as ***hydrochlorothiazide***, asthma medications such as ***albuterol*** inhalers, and the cancer chemotherapy drug ***cisplatin***.[63,64]

Potassium helps maintain a more *alkaline* or non-acidic tissue environment, which benefits bone health by reducing calcium losses in urine. People with higher potassium intake boast higher bone mineral density, reducing their risk of osteoporosis and potentially life-changing fractures.[56,65] Animal studies show that increasing potassium intake in combination with exercise improves both bone density and bone mineral content.[66] A modest amount of potassium, therefore, is a wise addition to a bone-health regimen.

Boron

Boron is a trace mineral that is essential to healthy bones since it supports the functions of calcium, magnesium, and vitamin D.[79-82] In a revealing study, postmenopausal women consumed a boron-deficient diet for 17 weeks, followed by 7 weeks of boron consumption. While on the boron-deficient diet, the women showed increased urinary loss of calcium and magnesium. When boron was re-introduced to their diet, urinary loss of calcium and magnesium declined, and hormones linked with healthy bone mass increased. These findings suggest that boron is crucial in helping maintain the body's optimal stores of bone-building calcium and magnesium.[81]

Modern eating habits make it difficult to obtain adequate amounts of boron from the typical diet. Scientists have discovered a plant-based form of boron called **calcium fructoborate**. Naturally found in fruits, vegetables, and other foods, this form of boron is highly stable and bioavailable and may provide antioxidant capabilities in addition to bone-building benefits.[83,84]

Summary

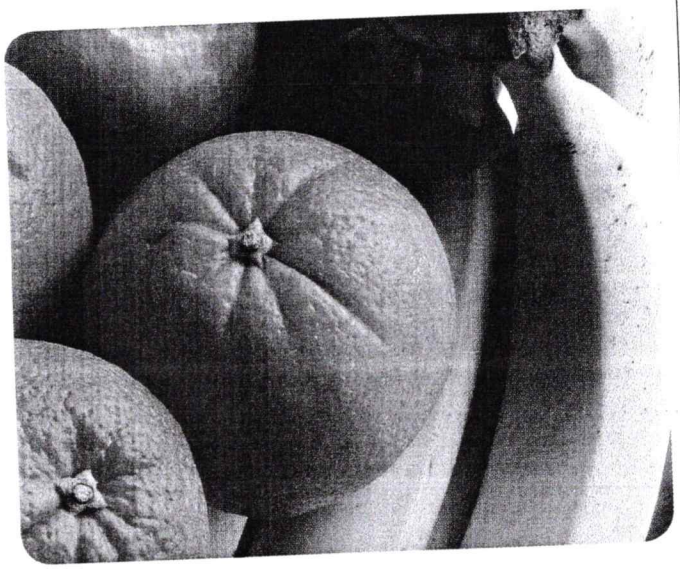
If current health trends continue, nearly half of all Americans over 50 will suffer from osteoporosis by the year 2020. Osteoporosis is just one of the consequences of inadequate bone nutrition. New research reveals that weak bones contribute to increased fat mass, decreased insulin sensitivity, inflammation, and greater risk of cardiovascular disease, among other conditions. While most maturing individuals know they need calcium for healthy bones, many remain unenlightened of the critical need for vitamin D3 vitamin K, magnesium, potassium, and boron.

As a result, nearly half of older Americans do no get enough bone health-promoting nutrients. ●

If you have a question on the scientific content of this article, please call a Life Extension® Health Advisor at 1-866-864-3027.

References

1. Clemens TL, Karsenty G. The osteoblast: An insulin target cell controlling glucose homeostasis. *J Bone Miner Res.* 2011 Apr;26(4):677-80.
2. Kim YS, Paik IY, Rhie YJ, Suh SH. Integrative physiology: defined novel metabolic roles of osteocalcin. *J Korean Med Sci.* 2010 Jul;25(7):985-91.
3. Confavreux CB. Bone: from a reservoir of minerals to a regulator of energy metabolism. *Kidney Int Suppl.* 2011 Apr (121):S14-9.
4. Available at: http://emedicine.medscape.com/article/1254517-overview. Accessed May 13, 2011.
5. US Department of Health and Human Services. Office of the Surgeon General. "Bone Health and Osteoporosis: A Report of the Surgeon General." October 14, 2004.
6. Grabowski P. Physiology of bone. *Endocr Dev.* 2009;16:32-48.
7. Simon LS. Osteoporosis. *Clin Geriatr Med.* 2005 Aug;21(3):603-29, viii.
8. London G, Coyne D, Hruska K, Malluche HH, Martin KJ. The new kidney disease: improving global outcomes (KDIGO) guidelines - expert clinical focus on bone and vascular calcification. *Clin Nephrol.* 2010 Dec;74(6):423-32.
9. Hinoi E. Control of bone remodeling by nervous system. Regulation of glucose metabolism by skeleton. Tangent point with nervous system. *Clin Calcium.* 2010 Dec;20(12):1814-9.
10. Wolf G. Energy regulation by the skeleton. *Nutr Rev.* 2008 Apr;66(4):229-33.
11. Ferron M, Wei J, Yoshizawa T, et al. Insulin signaling in osteoblasts integrates bone remodeling and energy metabolism. *Cell.* 2010 Jul 23;142(2):296-308.
12. Ferron M, McKee MD, Levine RL, Ducy P, Karsenty G. Intermittent injections of osteocalcin improve glucose metabolism and prevent type 2 diabetes in mice. Bone. 2011 Apr 29.
13. Gravenstein KS, Napora JK, Short RG, et al. Cross-sectional evidence of a signaling pathway from bone homeostasis to glucose metabolism. *J Clin Endocrinol Metab.* 2011 Mar 9.
14. Enriori PJ, Evans AE, Sinnayah P, Cowley MA. Leptin resistance and obesity. *Obesity (Silver Spring).* 2006 Aug;14 Suppl 5:254S-258S.
15. Wannamethee SG, Tchernova J, Whincup P, et al. Plasma leptin: associations with metabolic, inflammatory and haemostatic risk factors for cardiovascular disease. *Atherosclerosis.* 2007 Apr;191(2):418-26.
16. Henriksen JH, Holst JJ, Moller S, Andersen UB, Bendtsen F, Jensen G. Elevated circulating leptin levels in arterial hypertension: relationship to arteriovenous overflow and extraction of leptin. *Clin Sci (Lond).* 2000 Dec;99(6):527-34.
17. Soderberg S, Stegmayr B, Ahlbeck-Glader C, Slunga-Birgander L, Ahren B, Olsson T. High leptin levels are associated with stroke. *Cerebrovasc Dis.* 2003;15(1-2):63-9.
18. Ducy P. The role of osteocalcin in the endocrine cross-talk between bone remodelling and energy metabolism. *Diabetologia.* 2011Jun;54(6):1291-7.
19. Vermeer C, Theuwissen E. Vitamin K, osteoporosis and degenerative diseases of ageing. *Menopause Int.* 2011 Mar;17(1):19-23.
20. Demer LL, Tintut Y. Mechanisms linking osteoporosis with cardiovascular calcification. *Curr Osteoporos Rep.* 2009 Jul; 7(2):42-6.
21. Hjortnaes J, Butcher J, Figueiredo JL, et al. Arterial and aortic valve calcification inversely correlates with osteoporotic bone remodelling: a role for inflammation. *Eur Heart J.* 2010 Aug;31(16):1975-84.
22. Kaats GR, Preuss HG, Croft HA, Keith SC, Keith PL. A comparative effectiveness study of bone density changes in women over 40 following three bone health plans containing variations of the same novel plant-sourced calcium. *Int J Med Sci.* 2011;8(3):180-91.
23. Kim MH, Yeon JY, Choi MK, Bae YJ. Evaluation of magnesium intake and its relation with bone quality in healthy young Korean women. *Biol Trace Elem Res.* 2011 Apr 5.
24. Palacios C. The role of nutrients in bone health, from A to Z. *Crit Rev Food Sci Nutr.* 2006;46(8):621-8.
25. Cashman KD. Calcium intake, calcium bioavailability and bone health. *Br J Nutr.* 2002 May;87 Suppl 2:S169-77.
26. Spangler M, Phillips BB, Ross MB, Moores KG. Calcium supplementation in postmenopausal women to reduce the risk of osteoporotic fractures. *Am J Health Syst Pharm.* 2011 Feb 15;68(4):309-18.
27. Lips P, Bouillon R, van Schoor NM, et al. Reducing fracture risk with calcium and vitamin D. *Clin Endocrinol (Oxf).* 2010 Sep;73(3):277-85.
28. Ferrar L, van der Hee RM, Berry M, et al. Effects of calcium-fortified ice cream on markers of bone health. *Osteoporos Int.* 2010 Dec 18.
29. Chaturvedi P, Mukherjee R, McCorquodale M, Crawley D, Ashmead S, Guthrie N. Comparison of calcium absorption from various calcium-containing products in healthy human adults: a bioavailability study. *FASEB J.* 2006 Mar;20(Meeting Abstract Supplement):A1063.
30. Patrick L. Comparative absorption of calcium sources and calcium citrate malate for the prevention of osteoporosis. *Altern Med Rev.* 1999 Apr;4(2):74-85.
31. Available at: http://lpi.oregonstate.edu/infocenter/minerals/calcium/. Accessed May 12, 2011.
32. Ross AC, Manson JE, Abrams SA, et al. The 2011 dietary reference intakes for calcium and vitamin d: what dietetics practitioners need to know. *J Am Diet Assoc.* 2011 Apr;111(4):524-7.
33. Norman AW, Bouillon R. Vitamin D nutritional policy needs a vision for the future. *Exp Biol Med (Maywood).* 2010 Sep;235(9):1034-45.
34. Bacchetta J, Ranchin B, Dubourg L, Cochat P. Vitamin D revisited: a cornerstone of health? *Arch Pediatr.* 2010 Dec;17(12):1687-95.
35. Kidd PM. Vitamins D and K as pleiotropic nutrients: clinical importance to the skeletal and cardiovascular systems and preliminary evidence for synergy. *Altern Med Rev.* 2010 Sep;15(3):199-222.
36. Verhave G, Siegert CE. Role of vitamin D in cardiovascular disease. *Neth J Med.* 2010 Mar;68(3):113-8.
37. Querales MI, Cruces ME, Rojas S, Sanchez L. Association between vitamin D deficiency and metabolic syndrome. *Rev Med Chil.* 2010 Oct;138(10):1312-8.
38. Petchey WG, Hickman IJ, Duncan E, et al. The role of 25-hydroxyvitamin D deficiency in promoting insulin resistance and inflammation in patients with chronic kidney disease: a randomised controlled trial. *BMC Nephrol.* 2009;10:41.
39. Guillot X, Semerano L, Saidenberg-Kermanac'h N, Falgarone G, Boissier MC. Vitamin D and inflammation. *Joint Bone Spine.* 2010 Dec;77(6):552-7.



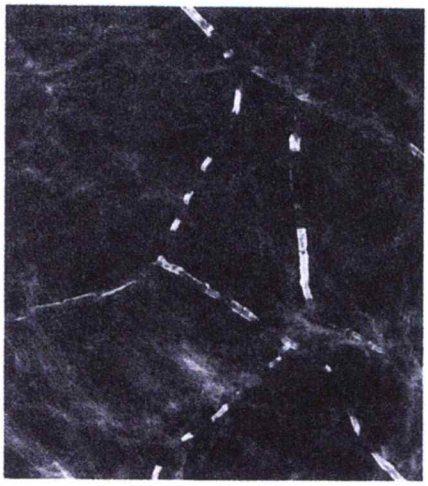
40. Edlich RF, Mason SS, Reddig JS, Gubler K, Long Iii WB. Revolutionary advances in the diagnosis of vitamin D deficiency. *J Environ Pathol Toxicol Oncol.* 2010;29(2):85-9.
41. Grant WB, Schwalfenberg GK, Genuis SJ, Whiting SJ. An estimate of the economic burden and premature deaths due to vitamin D deficiency in Canada. *Mol Nutr Food Res.* 2010 Aug;54(8):1172-81.
42. Jorde R, Sneve M, Hutchinson M, Emaus N, Figenschau Y, Grimnes G. Tracking of serum 25-hydroxyvitamin D levels during 14 years in a population-based study and during 12 months in an intervention study. *Am J Epidemiol.* 2010 Apr 15;171(8):903-8.
43. Pilz S, Tomaschitz A, Drechsler C, Dekker JM, Marz W. Vitamin D deficiency and myocardial diseases. *Mol Nutr Food Res.* 2010 Aug;54(8):1103-13.
44. Horani M, Dror A, Holland D, Caporaso F, Sumida KD, Frisch F. Prevalence of Vitamin D(3) Deficiency in Orange County Residents. *J Community Health.* 2011 Feb 13.
45. Holick MF. Vitamin D: evolutionary, physiological and health perspectives. *Curr Drug Targets.* 2011 Jan;12(1):4-18.
46. Faloon W. Startling findings about vitamin D levels in Life Extension® members. *Life Extension Magazine®.* 2010 Jan;16(1):7-14.
47. Wei MY, Giovannucci EL. Vitamin D and multiple health outcomes in the Harvard cohorts. *Mol Nutr Food Res.* 2010 Aug;54(8):1114-26.
48. Vieth R. Vitamin D supplementation, 25-hydroxyvitamin D concentrations, and safety. *Am J Clin Nutr.* 1999 May;69(5):842-56.
49. Vieth R. Vitamin D toxicity, policy, and science. *J Bone Miner Res.* 2007 Dec;22 Suppl 2:V64-8.
50. Garland CF, French CB, Baggerly LL, Heaney RP. Vitamin D supplement doses and serum 25-hydroxyvitamin D in the range associated with cancer prevention. *Anticancer Res.* 2011 Feb;31(2):607-11.
51. Kitchin B, Morgan SL. Not just calcium and vitamin D: other nutritional considerations in osteoporosis. *Curr Rheumatol Rep.* 2007 Apr;9(1):85-92.
52. Tucker KL. Osteoporosis prevention and nutrition. *Curr Osteoporos Rep.* 2009 Dec;7(4):111-7.
53. Martini LA. Magnesium supplementation and bone turnover. *Nutr Rev.* 1999 Jul;57(7):227-9.
54. Matsuzaki H. Prevention of osteoporosis by foods and dietary supplements. Magnesium and bone metabolism. *Clin Calcium.* 2006 Oct;16(10):1655-60.
55. Barbagallo M, Belvedere M, Dominguez LJ. Magnesium homeostasis and aging. *Magnes Res.* 2009 Dec;22(4):235-46.
56. Tucker KL, Hannan MT, Chen H, Cupples LA, Wilson PW, Kiel DP. Potassium, magnesium, and fruit and vegetable intakes are associated with greater bone mineral density in elderly men and women. *Am J Clin Nutr.* 1999 Apr;69(4):727-36.
57. Ryder KM, Shorr RI, Bush AJ, et al. Magnesium intake from food and supplements is associated with bone mineral density in healthy older white subjects. *J Am Geriatr Soc.* 2005 Nov;53(11):1875-80.
58. Aydin H, Deyneli O, Yavuz D, et al. Short-term oral magnesium supplementation suppresses bone turnover in postmenopausal osteoporotic women. *Biol Trace Elem Res.* 2010 Feb;133(2):136-43.
59. Toba Y, Kajita Y, Masuyama R, Takada Y, Suzuki K, Aoe S. Dietary magnesium supplementation affects bone metabolism and dynamic strength of bone in ovariectomized rats. *J Nutr.* 2000 Feb;130(2):216-20.
60. Matsuzaki H, Miwa M. Dietary calcium supplementation suppresses bone formation in magnesium-deficient rats. *Int J Vitam Nutr Res.* 2006 May;76(3):111-6.
61. Bae YJ, Kim MH. Calcium and Magnesium Supplementation Improves Serum OPG/RANKL in Calcium-Deficient Ovariectomized Rats. *Calcif Tissue Int.* 2010 Oct;87(4):365-72.
62. Available at: http://www.therapeuticsdaily.com/news/article.cfm?contenttype=sentryarticle&contentvalue=1989790&channelID=26. Accessed May 13, 2011.
63. Luckey AE, Parsa CJ. Fluid and electrolytes in the aged. *Arch Surg.* 2003 Oct;138(10):1055-60.
64. Passare G, Viitanen M, Torring O, Winblad B, Fastbom J. Sodium and potassium disturbances in the elderly : prevalence and association with drug use. *Clin Drug Investig.* 2004;24(9):535-44.
65. McCarty MF. Rationale for a novel nutraceutical complex 'K-water': potassium taurine bicarbonate (PTB). *Med Hypotheses.* 2006;67(1):65-70.
66. Rico H, Aznar L, Hernandez ER, et al. Effects of potassium bicarbonate supplementation on axial and peripheral bone mass in rats on strenuous treadmill training exercise. *Calcif Tissue Int.* 1999 Sep;65(3):242-5.
67. Wallin R, Schurgers L, Wajih N. Effects of the blood coagulation vitamin K as an inhibitor of arterial calcification. *Thromb Res.* 2008;122(3):411-7.
68. Fodor D, Albu A, Poanta L, Porojan M. Vitamin K and vascular calcifications. *Acta Physiol Hung.* 2010 Sep;97(3):256-66.
69. Yamaguchi M, Uchiyama S, Tsukamoto Y. Inhibitory effect of menaquinone-7 (vitamin K2) on the bone-resorbing factors-induced bone resorption in elderly female rat femoral tissues in vitro. *Mol Cell Biochem.* 2003 Mar;245(1-2):115-20.
70. Yamaguchi M, Weitzmann MN. Vitamin K2 stimulates osteoblastogenesis and suppresses osteoclastogenesis by suppressing NF-kappaB activation. *Int J Mol Med.* 2011 Jan;27(1):3-14.
71. Takemura H. Prevention of osteoporosis by foods and dietary supplements. "Kinnotsubu honegenki": a fermented soybean (natto) with reinforced vitamin K2 (menaquinone-7). *Clin Calcium.* 2006 Oct;16(10):1715-22.
72. Tsukamoto Y. Studies on action of menaquinone-7 in regulation of bone metabolism and its preventive role of osteoporosis. *Biofactors.* 2004;22(1-4):5-19.
73. van Summeren MJ, Braam LA, Lilien MR, Schurgers LJ, Kuis W, Vermeer C. The effect of menaquinone-7 (vitamin K2) supplementation on osteocalcin carboxylation in healthy prepubertal children. *Br J Nutr.* 2009 Oct;102(8):1171-8.
74. Forli L, Bollerslev J, Simonsen S, et al. Dietary vitamin K2 supplement improves bone status after lung and heart transplantation. *Transplantation.* 2010 Feb 27;89(4):458-64.
75. Inoue T, Fujita T, Kishimoto H, et al. Randomized controlled study on the prevention of osteoporotic fractures (OF study): a phase IV clinical study of 15-mg menatetrenone capsules. *J Bone Miner Metab.* 2009;27(1):66-75.
76. Shea MK, Booth SL. Update on the role of vitamin K in skeletal health. *Nutr Rev.* 2008 Oct;66(10):549-57
77. Reese AM, Farnett LE, Lyons RM, Patel B, Morgan L, Bussey HI. Low-dose vitamin K to augment anticoagulation control. *Pharmacotherapy.* 2005 Dec;25(12):1746-51.
78. Lurie Y, Loebstein R, Kurnik D, Almog S, Halkin H. Warfarin and vitamin K intake in the era of pharmacogenetics. *Br J Clin Pharmacol.* 2010 Aug;70(2):164-70.
79. Schaafsma A, de Vries PJ, Saris WH. Delay of natural bone loss by higher intakes of specific minerals and vitamins. *Crit Rev Food Sci Nutr.* 2001 May;41(4):225-49.
80. Miggiano GA, Gagliardi L. Diet, nutrition and bone health. *Clin Ter.* 2005 Jan-Apr;156(1-2):47-56.
81. Nielsen FH, Hunt CD, Mullen LM, Hunt JR. Effect of dietary boron on mineral, estrogen,and testosterone metabolism in postmenopausal women. *FASEB J.* 1987 Nov;1(5):394-7.
82. Hegsted M, Keenan MJ, Siver F, Wozniak P. Effect of boron on vitamin D deficient rats. *Biol Trace Elem Res.* 1991 Mar;28(3):243-55.
83. Palacios C. The role of nutrients in bone health, from A to Z. *Crit Rev Food Sci Nutr.* 2006;46(8):621-8.
84. Scorei R, Cimpoiasu VM, Iordachescu D. In vitro evaluation of the antioxidant activity of calcium fructoborate. *Biol Trace Elem Res.* 2005 Nov;107(2):127-34.

OSTEOPOROSIS IS SCURVY OF THE BONE, NOT CALCIUM DEFICIENCY

by Dr Suzanne Humphries

It saddens me to see older women diagnosed with "osteopenia" or "osteoporosis" listening to their doctors and taking supplemental calcium and even problematic drugs called bisphosphonates. These are irrational, dogmatic, harmful approaches to the problem of degrading bone as we age.

In my time practising nephrology and internal medicine, I saw numerous patients suffering from vascular disease while taking the recommended doses of calcium. X-rays revealed perfect outlines of calcified blood vessels and calcified heart valves.



Pictured above is a calcified breast artery, often seen in women who are being treated for hypertension. The primary drug used in high blood pressure, a thiazide diuretic, causes the body to retain calcium and lose magnesium and potassium. We incidentally note these types of calcifications in the large arteries of the entire body, not just the breasts. I believe these problems are avoidable.

The matrix of bone will incorporate calcium and nutrients where they belong as long as the proper hormones and nutrients are present. Needless to say gravitational force in the form of weight-bearing exercise is essential and should be the foundation to a healthy skeleton. Don't be afraid to exercise with some weight in a backpack if you have no disk disease or low back pain.

You still have to look at what you can do nutritionally, and in interpersonal relationships to help your body heal itself. Supplements are no replacement for good nutrition. After all, scientists are constantly discovering new things about food and its interaction with the body that we don't know.

The first thing to do is either search online or look in your reference books to find foods rich in vitamin C, vitamin K2, magnesium and minor minerals such as boron and silica. Silica is also important for bones.

Remember too, that depression has many causes. Sometimes the cause can be nutritional deficiencies and sometimes depression can result from entrapment in unhealthy family dynamics. Controversially, I would add that depression can also have spiritual origins.

But if time feels of the essence, then supplementation is one route which could be taken. While the medical profession supplements with calcium and Fosamax, in my opinion, a more constructive supplementation regimen could include vitamin C, vitamin K2, vitamin D3 (in winter months, sun in summer) and boron, silica and magnesium. These are all far more important in preventing fracture and keeping bone healthy than calcium.

Calcium will ultimately land in the muscles of the heart, the heart valves and the blood vessels, leading to cardiovascular disease. However if you are getting enough vitamins C, D3 and K2, your body will direct the calcium you ingest from your food, to where it belongs, not in your heart and blood vessels.

Vitamin C does several things to strengthen bones:

1. It mineralises the bone and stimulates bone-forming cells to grow.
2. Prevents too much degradation of bone by inhibiting bone-absorbing cells.
3. Dampens oxidative stress, which is what ageing is.
4. Is vital in collagen synthesis.

When vitamin C is low, just the opposite happens. Bone cells that degrade bone (called osteoclasts) proliferate, and bone cells that lay down mineral and new bone (called osteoblasts) are not formed.

Studies have shown that elderly patients who fractured bones had significantly lower levels of vitamin C in their blood than those who haven't fractured.[1] Bone mineral density—the thing that the tests measure, is higher in those who supplement with vitamin C, independent of oestrogen level.[2,3]

Vitamin K2 is well known among holistic practitioners to be important in cardiovascular and bone health. Supplementing this is also a good idea if bone or heart issues are a concern.

And of course good old vitamin D3 with a level around 50–70 mg/ml will help keep the immune system functioning well and the bones strong.

This may seem like a lot of supplementing, yet to me is a worthwhile endeavour that will keep much more than the bones strong. These days getting enough vitamin C is not so easy with diet alone. With the toxic load we all have, even with the most pristine diets, we are requiring more vitamin C internally than our ancestors did.

Adults would do well to take 2–5 grams per day of sodium ascorbate as a general supplement. If you have active kidney stones, or kidney disease please check with your doctor first.

Humans, monkeys and guinea pigs don't make any vitamin C. This leaves us on our own to get our needs met. Cats weighing only about 10–15 pounds synthesise more than 15 times the RDA of

vitamin C recommended for humans. Goats are about the size of a human adult, and under no stress they synthesise 13g per day. Under stress it can rise to 100g.

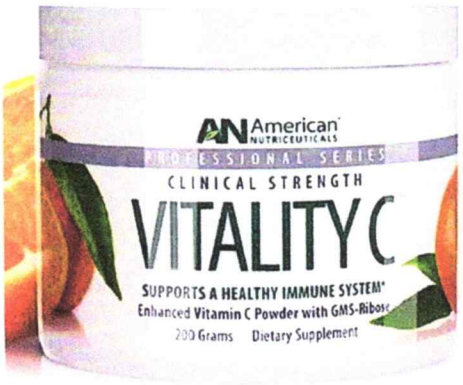
Do not fear taking vitamin C. It is one of the most non-toxic and safe supplements known. Use liposomal vitamin C, sodium ascorbate or ascorbic acid, never Ester-C or calcium ascorbate. If you prefer a natural plant-based source, camu-camu is very high in C. However its harvest does threaten the rainforest.

References

1. Falch, 1998. "Low levels of serum ascorbic acid in elderly patients with hip fracture." Scand J Clin Lab Invest May 58(3): 225-8
2. Morton D. 2001. "Vitamin C supplement use and bone mineral density in postmenopausal women" J Bone and Min Res 16(1), 135-140
3. Leveille, 1997. "Dietary vitamin C and bone mineral density in postmenopausal women in Washington State, USA" J Epid and Comm Health. 51(5):479-485

Dr Suzanne Humphries is a conventionally educated medical doctor who has taken the walk into, around, and out of the allopathic paradigm. She fully and successfully participated in the conventional system for 19 years, witnessing first-hand how that approach fails patients and creates new disease time and again. Prior to medical school, she earned a bachelor's degree in physics from Rutgers University.

(Source: DrSuzanne.net; 7 August 2012; http://tinyurl.com/y7e8uj85)



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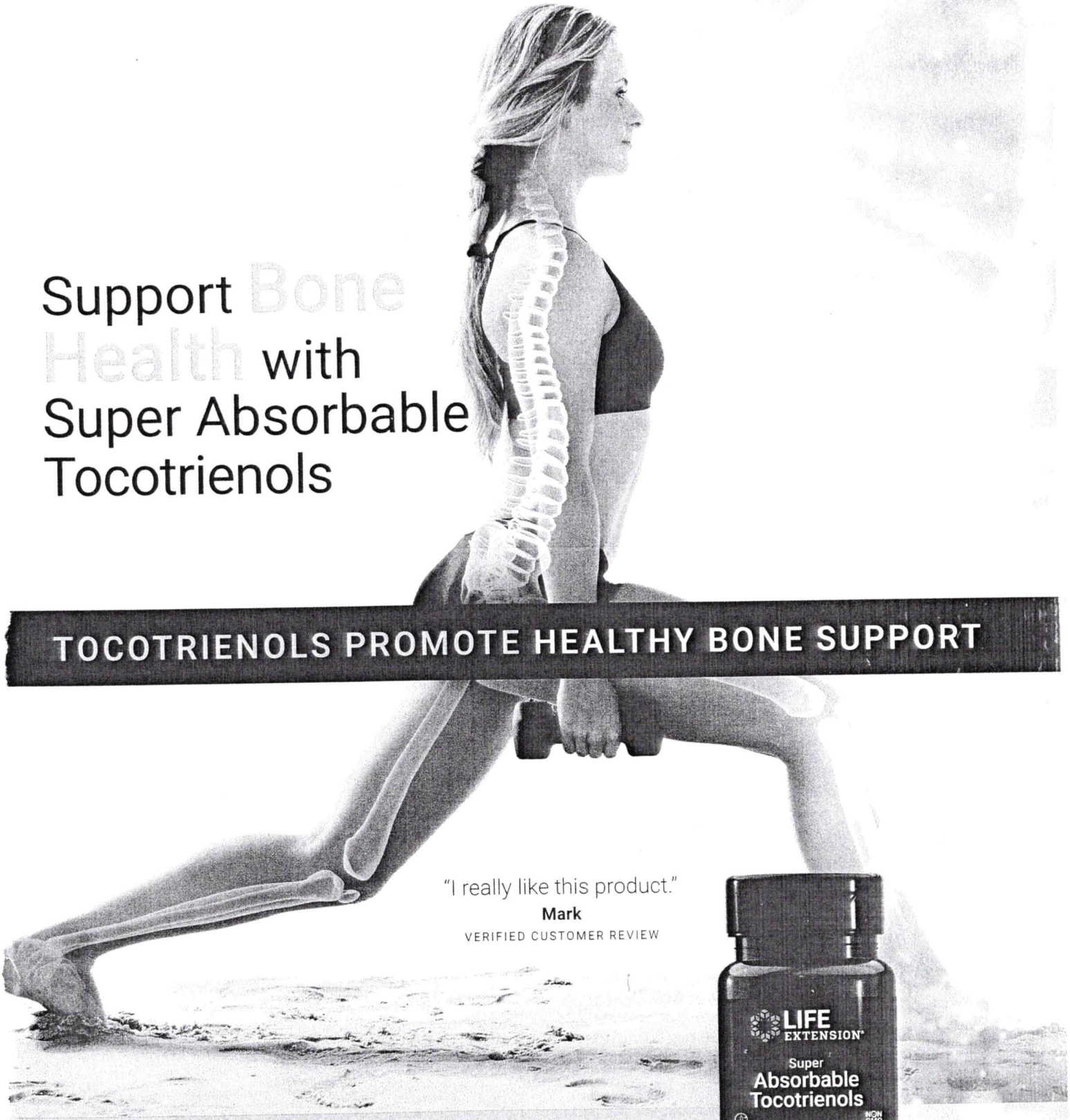

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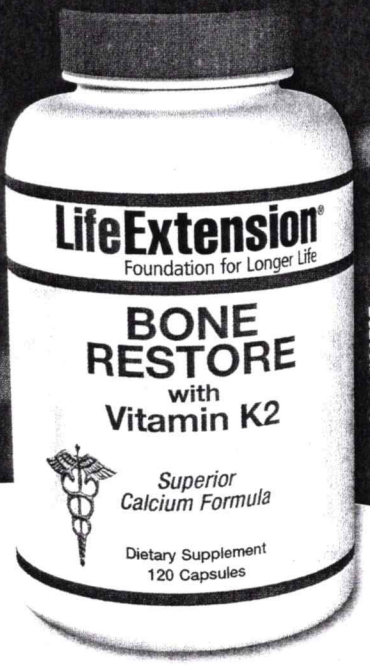

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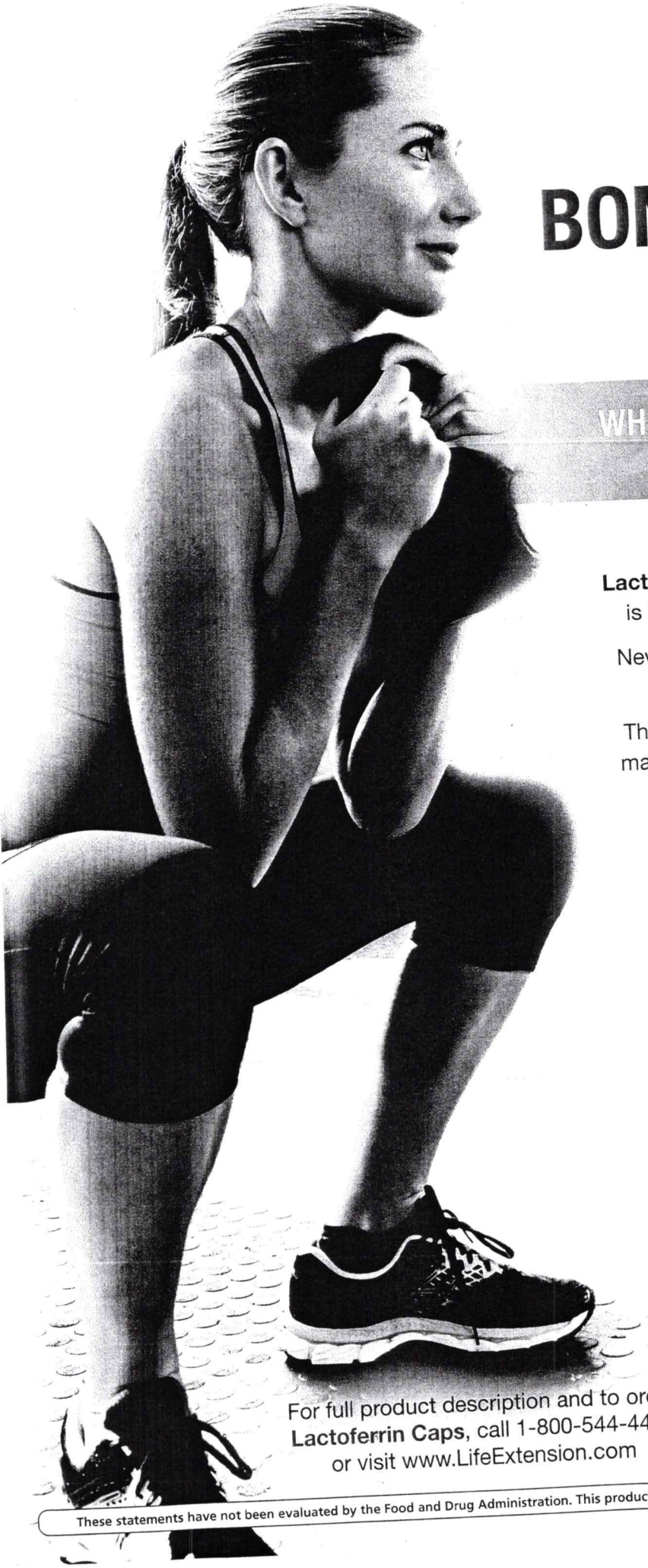

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The New York Times

PERSONAL HEALTH

12 Minutes of Yoga for Bone Health

By Jane E. Brody December 21, 2015 5:45 am

PERSONAL HEALTH
Jane Brody on health and aging.

Yoga enthusiasts link the practice to a long list of health benefits, including greater flexibility and range of motion, stronger muscles, better posture and balance, reduced emotional and physical stress, and increased self-awareness and self-esteem.

But definitively proving these benefits is challenging, requiring years of costly research. A pharmaceutical company is unlikely to fund a study that doesn't involve a drug, and in any event, the research requires a large group of volunteers tracked over a very long time.

The subjects must provide health measurements at the outset, learn the proper poses, continue to do them regularly for years and be regularly evaluated.

No one knows these challenges better than Dr. Loren M. Fishman, a physiatrist at Columbia University who specializes in rehabilitative medicine. For years, he has been gathering evidence on yoga and bone health, hoping to determine whether yoga might be an effective therapy for osteoporosis.

The idea is not widely accepted in the medical community, but then, researchers know comparatively little about complementary medicine in general. So in 2005, Dr. Fishman began a small pilot study of yoga moves that turned up some encouraging

results. Eleven practitioners had increased bone density in their spine and hips, he reported in 2009, compared with seven controls who did not practice yoga.

Knowing that more than 700,000 spinal fractures and more than 300,000 hip fractures occur annually in the United States, Dr. Fishman hoped that similar findings from a much larger study might convince doctors that this low-cost and less dangerous alternative to bone-loss drugs is worth pursuing.

Those medications can produce adverse side effects like gastrointestinal distress and fractures of the femur. Indeed, a recent study published in Clinical Interventions in Aging found that among 126,188 women found to have osteoporosis, all of whom had Medicare Part D drug coverage, only 28 percent started bone drug therapy within a year of diagnosis.

Many of those who avoided drugs were trying to avoid gastrointestinal problems.

On the other hand, yoga's "side effects," Dr. Fishman and colleagues wrote recently, "include better posture, improved balance, enhanced coordination, greater range of motion, higher strength, reduced levels of anxiety and better gait."

Weight-bearing activity is often recommended to patients with bone loss, and Dr. Fishman argues that certain yoga positions fit the bill.

"Yoga puts more pressure on bone than gravity does," he said in an interview. "By opposing one group of muscles against another, it stimulates osteocytes, the bone-making cells."

Most experts argue that it's difficult, perhaps impossible, for adults to gain significant bone mass. Undeterred, Dr. Fishman invested a chunk of his own money and with three collaborators — Yi-Hsueh Lu of The Rockefeller University, Bernard Rosner of Brigham and Women's Hospital, and Dr. Gregory Chang of New York University — solicited volunteers worldwide via the Internet for a follow-up to his small pilot study.

Of the 741 people who joined his experiment from 2005 to 2015, 227 (202 of them women) followed through with doing the 12 assigned yoga poses daily or at

least every other day. The average age of the 227 participants upon joining the study was 68, and 83 percent had osteoporosis or its precursor, osteopenia.

The 12 poses, by their English names, were tree, triangle, warrior II, side-angle, twisted triangle, locust, bridge, supine hand-to-foot I, supine hand-to-foot II, straight-legged twist, bent-knee twist and corpse pose. Each pose was held for 30 seconds. The daily regimen, once learned, took 12 minutes to complete.

The researchers collected data at the start of the study on the participants' bone density measurements, blood and urine chemistry and X-rays of their spines and hips. They were each given a DVD of the 12 yoga poses used in the pilot study and an online program in which to record what they did and how often.

A decade after the start of the study, bone density measurements were again taken and emailed to the researchers; many participants also had repeat X-rays done. The findings, as reported last month in Topics of Geriatric Rehabilitation, showed improved bone density in the spine and femur of the 227 participants who were moderately or fully compliant with the assigned yoga exercises.

Improvements were seen in bone density in the hip as well, but they were not statistically significant.

Before the study, the participants had had 109 fractures, reported by them or found on X-rays.

At the time the study was submitted for publication, "with more than 90,000 hours of yoga practiced largely by people with osteoporosis or osteopenia, there have been no reported or X-ray detected fractures or serious injuries of any kind related to the practice of yoga in any of the 741 participants," Dr. Fishman and his colleagues wrote.

"Yoga looks like it's safe, even for people who have suffered significant bone loss," Dr. Fishman said in an interview.

Furthermore, a special study of bone quality done on 18 of the participants showed that they had "better internal support of their bones, which is not measured by a bone density scan but is important to resisting fractures," Dr. Fishman said.

The study has many limitations, including the use of self-selected volunteers and the lack of a control group. But all told, the team concluded, the results may lend support to Dr. Fishman's long-held belief that yoga can help reverse bone loss.

Even if bone density did not increase, improvements in posture and balance that can accrue from the practice of yoga can be protective, Dr. Fishman said.

"Spinal fractures can result from poor posture, and there's no medication for that, but yoga is helpful," he said.

In addition, "Yoga is good for range of motion, strength, coordination and reduced anxiety," he said, "all of which contribute to the ability to stay upright and not fall. If you don't fall, you greatly reduce your risk of a serious fracture."

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A version of this article appears in print on 12/22/2015, on page D5 of the NewYork edition with the headline: Benefits of Yoga May Go Bone-Deep.

Treating Osteoporosis Holistically

A Spotlight on Susan Brady of Nurtured Bones

Osteoporosis is a progressive bone disease affecting 54 million Americans. It is characterized by deterioration of bone tissue leading to loss of bone mass and bone strength. Bones become weak and fragile, leaving them at an increased risk for fractures. In fact, the disease causes an estimated 2 million broken bones every year.

Susan Brady of Nurtured Bones, based in Northern Virginia, has developed a trademarked treatment, the BONES method, to approach osteoporosis in a holistic manner. The treatment includes balanced nutrition, optimized digestion, nurturing the soul, exercise and taking supplements, when necessary. Even though she starts with a "food first" approach to nutrition, she feels it is often necessary to take supplements to ensure that people are getting all the critical bone-building nutrients.

"My first goal is to understand the cause of bone loss or inability to adequately rebuild bone. I look at health history, dietary intake, exercise habits, lifestyle habits, digestion, stress levels and all recent lab work. I may also ask a patient to do additional testing such as a Pyrilinks-D urine test to evaluate active bone loss, serum bloods tests to evaluate active bone deposition, digestive stool analysis if there are digestive concerns or an adrenal stress test to evaluate cortisol levels if chronic stress is evident," notes Brady.

The importance of seeking a holistic treatment to osteoporosis stems from the fact that most allopathic doctors lean toward a pharmaceutical approach to treatment. While many patients respond to this approach, for others, the medications can cause unwanted side effects and have even been known to cause spontaneous fractures.

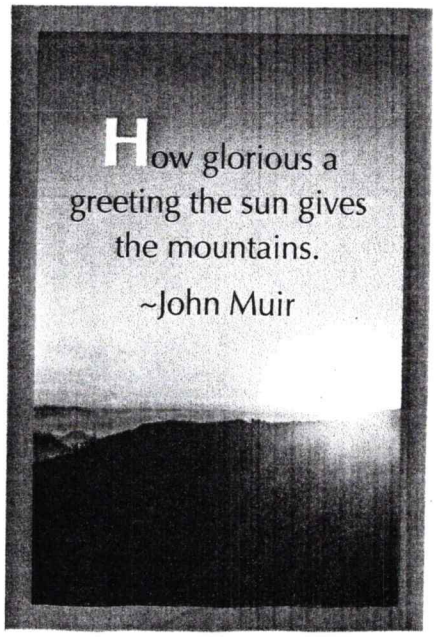
Also, a common recommendation for patients is to take calcium and vitamin D, yet it has been shown that there are many other nutrients critical to bone health. Brady explains that "the use of calcium and vitamin D without the other essential complementary nutrients can cause damaging effects to other tissues in the body. That is evident by the latest research coming out about excessive intake of calcium supplements promoting heart disease. Although calcium is essential to building the matrix of the bone, without nutrients such as magnesium and vitamin K, the calcium can't get into the bone and instead, ends up in other tissues or forming plaques."

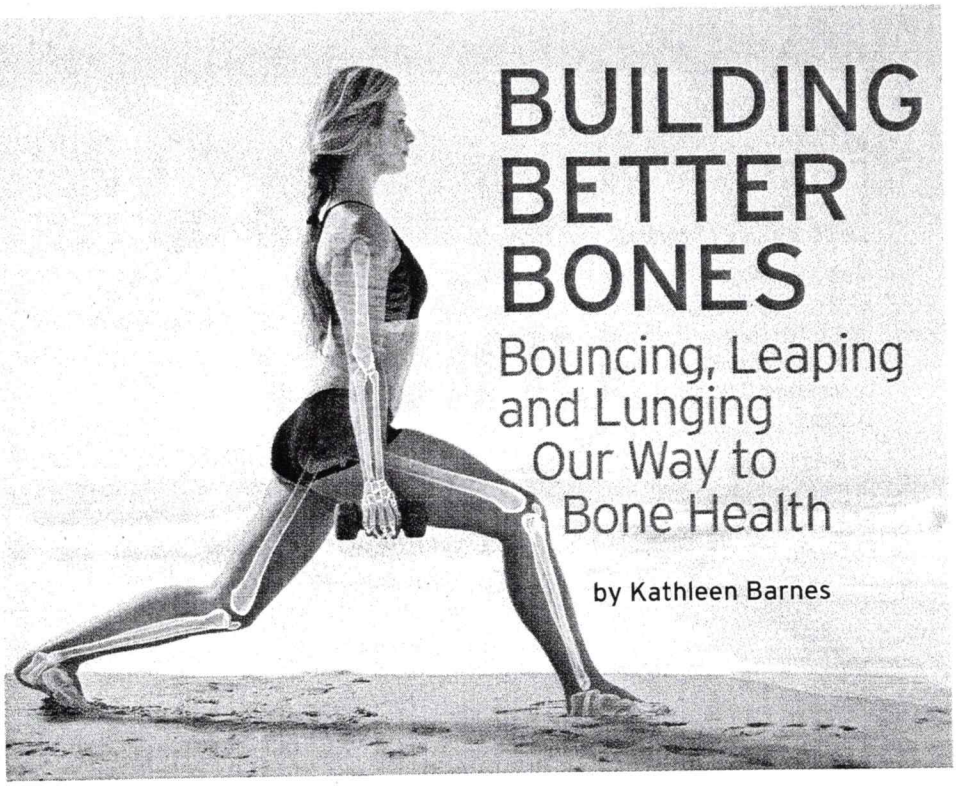
Brady is using the month of May, which is National Osteoporosis Month, to make sure that others know that there is a misconception that osteoporosis is an inevitable part of the aging process. If one gets the necessary bone-building nutrients from diet and exercise, while reducing stress, and avoiding dietary habits and behaviors that cause bone loss, osteoporosis can be prevented, and in many cases, even reversed.

Brady, with a master's degree in physical therapy, has been working with osteoporosis patients for more than 27 years. After realizing how important a holistic approach is to healing, she continued her education to become a doctor of Integrative Medicine, obtained certification in nutrition and then a post-master's degree in Integrative Health and Nutrition.

"Over the years, I have been shocked by the rise in osteoporosis as well the spontaneous femur fractures that were occurring as a side effect of the medications. That's when I began to really study and understand bone loss and realized that it can be prevented and even reversed through a holistic, non-pharmaceutical approach. I developed the BONES Method to address bone loss through a comprehensive and holistic approach. Many people become fearful of breaking a bone that could leave them severely debilitated. I love working with people to show them how they can strengthen their bones, so they can age vibrantly and without fear."

Susan Brady is available for a consultation by phone, via Skype or in person in Great Falls (location provided upon request) or at the Virginia Therapy and Fitness Center, 1831 Wiehle Ave., in Reston. To learn more or schedule an appointment, call 703-738-4230, email Susan@NurturedBones.com or visit NurturedBones.com. *See ad, page 17.*





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BUILDING BETTER BONES

Bouncing, Leaping and Lunging Our Way to Bone Health

by Kathleen Barnes

Success in the quest for stronger bones is possible at any age.

Start and Stay Young

"Peak bone strength is reached by the age of 30, so it's vital for young people to engage in dynamic impact movement through their teen years and 20s," says Sherri Betz, chair of the American Physical Therapy Association bone health group, a doctor of physical therapy and geriatric-certified specialist with a private practice in Santa Cruz, California.

Engaging in sports during our youthful developing years helps build strong, wide and dense bones that will carry us well into old age, literally giving us a firmer base to stand on. It's paramount to encourage children and young people to be physically active and for us all to continue with athletic activities throughout adulthood to preserve the bone health peak we reach at age 30.

Optimal Bone Exercises

"Adulthood is a perfectly good time to start building and improving bone fitness and health. The outcome is just a little bit less," says Steven A. Hawkins, Ph.D., a professor of exercise science at California Lutheran University, in Thousand Oaks.

"Bone responds to exercise much like muscle," explains Larry Tucker, Ph.D., professor of exercise sciences at Brigham Young University, in Provo, Utah. "Bone doesn't grow, *per se*, but like muscle, it does get denser and stronger according to the stresses and strains put on it."

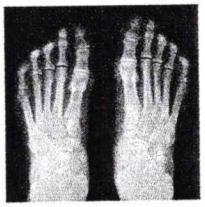
"The key is to put a heavy load on bones to stimulate them to grow," Hawkins notes.

Standing exercises are recommended, because the bones most likely to benefit from strengthening exercise are 30 targeted leg and hip bones, says Tucker.

"Surprising the bone is your best bet," points out Betz. "Don't do the same things over and over again at the same time, either repetitive exercises like running or weight lifting or consistent combinations; even high-intensity exercise can diminish the effects."

The most highly recommended exercises involve those that require changing directions, bouncing and leaping—from basketball to lively dances, and even some intense yoga postures. Hopping and jumping are probably the best way to strengthen bones, but must be done in the proper way, according to Tucker and others. Research by Tucker's team published in the *American Journal of Health Promotion* studied the effects of jumping on hip bone density in premenopausal women. It may seem counterintuitive, but Tucker reports

Best Bone Test



The most common way of testing bone density is a DEXA (dual-energy X-ray absorptiometry) scan. The result is called a T-score and is one case where a zero is perfect. A score of +1.0 to -1.0 is considered normal. A score between -1.0 and -2.5 is considered osteopenia, or weakened bones. A score lower than -2.5 indicates some level of osteoporosis.

The National Osteoporosis Foundation recommends bone density testing for women and men older than 65 and 70, respectively, and those that are petite, prone to breaking bones or have other risk factors.

For more information, visit Tinyurl.com/BoneDensityTest.

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that most benefits are gained from jumping as high as possible, resting 30 seconds and repeating up to 10 times twice a day in intervals at least eight hours apart. "If you jump continuously, the exercise loses effectiveness pretty quickly," he says.

Those that enjoy circuit training should do something else during the 30-second rests between repetitions, Tucker advises. Because it's the jolt of jumping that stimulates bone strength, using a mini-trampoline or another cushioning device to lessen impact on the body won't increase bone density.

Betz cautions against starting a jumping program too quickly. "Proper alignment, balance and body awareness come first," she says. "Do 20 to 25 heel raises in a row, a full squat with good alignment and a full lunge to ready the body for a jumping program." Such strengthening safeguards against falling and injury.

Walking Isn't It

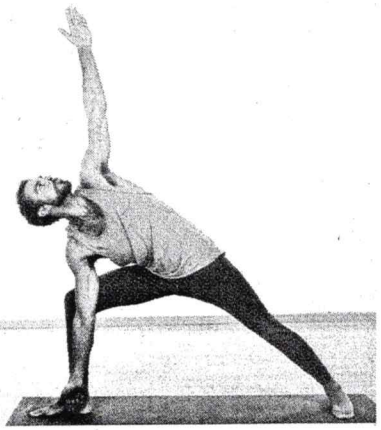
Walking, running, weight training and other repetitive exercises don't improve bone density, says Hawkins. "Walk and do other repetitive exercises for cardiovascular health and general fitness. While these might help maintain current bone strength, they won't improve bone density." Walking reduced the risk of hip fracture by 41 percent for postmenopausal women walking four hours a week, with fewer falls due to improved strength, balance and other factors per the *Journal of the American Medical Association*.

Numerous studies confirm that exercise of any kind keeps us healthy, but for bone health, the answer is to start weight-bearing exercises early and sustain the practice for a lifetime.

Kathleen Barnes is a health writer and author of The Calcium Lie II: What Your Doctor Still Doesn't Know, *with Dr. Robert Thompson. Connect at KathleenBarnes.com.*

Yoga for Bones

Yoga doesn't involve bouncing or jumping for the most part, but it can be helpful in maintaining strong bones, says Sherri Betz, a Santa Cruz, California, physical therapist and Pilates and yoga instructor. "Poses, including the tree, chair, warrior, triangle, half moon and sun salute, need to be as dynamic as possible and focus on leg strengthening and spine extension.



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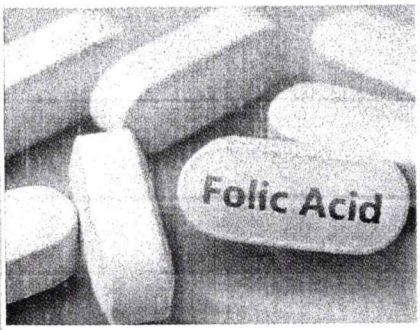
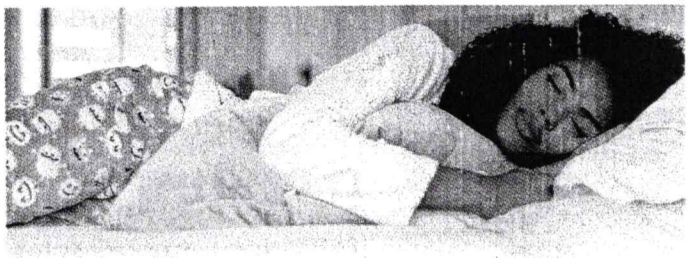


Researchers from Beijing Geriatric Hospital, in a meta-analysis of 12 studies involving 47,523 patients with cardiovascular disease, found that those that supplemented with folic acid (vitamin B_9) reduced their risk of stroke by 15 percent. Folic acid, which the study authors called a "safe and inexpensive therapy," lowers levels of homocysteine, an amino acid linked to heart disease; research indicates that 0.5 to 5 milligrams daily can reduce homocysteine levels by approximately 25 percent.



Cut Back on Sugar and Carbs to Improve Sleep

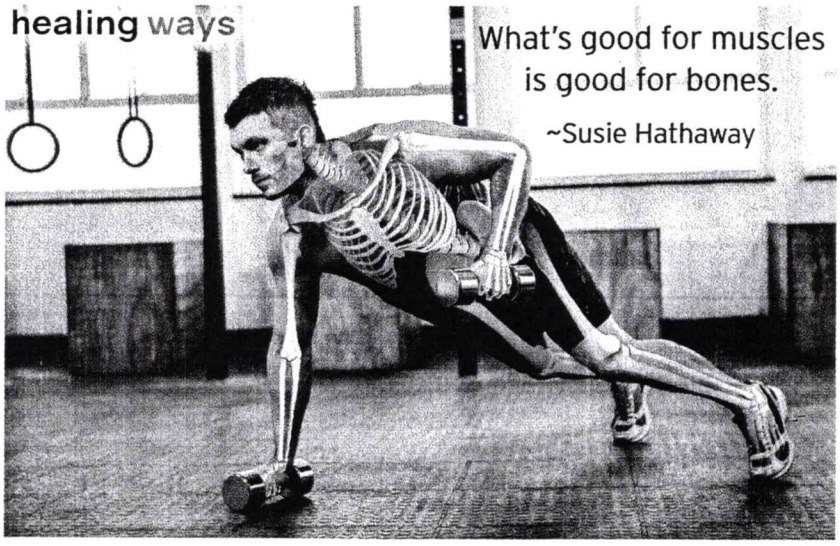
Women that toss and turn at night might sleep better if they pass up sugary treats for fruit, suggests a new study from Columbia University. Examining records of nearly 50,000 postmenopausal women in the Women's Health Initiative, researchers found those that consumed a diet high in refined carbohydrates—particularly added sugars and processed grains—were more likely to develop insomnia. Women with a diet that included higher amounts of vegetables, fiber and whole fruit (not juice) were less likely to have trouble sleeping. "When blood sugar is raised quickly, your body reacts by releasing insulin, and the resulting drop in blood sugar can lead to the release of hormones such as adrenaline and cortisol, which can interfere with sleep," explains senior author James Gangwisch, Ph.D.

Practice Yoga to Help the Brain

It's long been known that vigorous, sweaty aerobics strengthen the brain and help grow new neurons, but the latest research from the University of Illinois at Urbana-Champaign shows that practicing gentle hatha yoga enhances many of those same brain structures and functions. The analysis, published in *Brain Plasticity*, examined 11 studies that used brain-imaging techniques to evaluate outcomes of hatha yoga, which involves body movements, meditation and breathing exercises. The researchers concluded that the hippocampus, which is involved in memory processing and typically shrinks with age, increased in volume with yoga. The amygdala, which helps regulate emotions, tends to be larger in yoga practitioners. Other brain regions that are larger or more efficient in enthusiasts are the prefrontal cortex, essential to planning and decision-making; the default mode network, involved in planning and memory; and the cingulate cortex, which plays a key role in emotional regulation, learning and memory.

Catch Some Rays to Boost Gut Health

Fresh evidence is emerging of a skin-gut axis that links type B ultraviolet (UVB) exposure to the microbiome, a finding that has implications for those suffering from autoimmune and inflammatory diseases. University of British Columbia researchers divided 21 healthy young women into two groups: Nine took vitamin D supplements during Vancouver's long, dark winter, and 12 didn't. After three months, only the non-supplement-takers tested as being deficient in vitamin D. Both groups were exposed to three, one-minute, full-body UVB light sessions; within a week, vitamin D levels increased 10 percent on average and the gut microbiota diversity of the low-D group rose to match that of the sufficient-D group. Along with other probiotic bacteria, *Lachnospiraceae* species, typically low in the guts of people with inflammatory diseases, increased with the UVB exposure.



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BEYOND CALCIUM
Full-Spectrum Bone Health

by Marlaina Donato

Our bones are the foundation that supports our bodies and the quality of our lives. Unlike the brick and mortar and bedrock of a building, the human skeletal system is living tissue that breaks down and rebuilds; this constant remodeling demands much more than just taking an obligatory calcium supplement.

> Osteoporosis can be prevented, and I've seen many patients reverse osteoporosis.
>
> ~Leat Kuzniar

Compromised bone health is most often associated with postmenopausal women, but it can also impact men and younger adults. Genetics, hormonal changes and nutritional deficiencies can all foster bone loss. The National Osteoporosis Foundation reports that 44 million Americans have low bone density and 10 million suffer from osteoporosis, facing a high risk of fracture from this debilitating condition.

Fortunately, it's never too early or too late to do right by our bones. "Osteoporosis can be prevented, and I've seen many patients reverse osteoporosis," says Leat Kuzniar, a Nutley, New Jersey, naturopath. "It becomes more difficult after menopause and if the bone density is very low, but we can always make some improvements in bone health. We need to assess diet, exercise, gastrointestinal health, hormones, medications, pH and even stress levels."

Synergy of Vitamins and Minerals

Walter Willett, M.D., chairman of the Department of Nutrition at the Harvard T.H. Chan School of Public Health, argues that the daily recommended 1,000-to-1,200 milligrams of calcium is based on inadequate studies, and advises half that amount.

Other minerals may play an equally critical role. The body robs calcium from the bones when blood levels of this vital mineral fall too low; but taking a calcium supplement—especially without co-nutrients—can increase fracture risk. "Calcium supplementation is complex; more isn't better. Vitamin D is essential for calcium absorption, and vitamin K2 is essential for getting that calcium to your bones and keeping it out of your arteries," Kuzniar says. Magnesium, phosphorus, zinc and potassium are also allies in calcium metabolism.

Vitamin C, too, is a key player in bone health, promoting collagen synthesis. Nutrient absorption relies on integrity of gut health, so opting for probiotics is a wise choice across the board.

Bone Up on Superfoods

Optimally, the quest for stronger bones begins with a nutrient-dense diet. "Plenty of fruits and vegetables, whole grains, protein and some fats create a physiology in the body to support optimal bone health. Avoiding too much sodium and animal protein also helps," says Mary Jane Detroyer, a New York City-based nutritionist and certified dietitian. She underscores the importance of mineral-packed kale, collards, mustard greens, bok choy and broccoli, but warns against oxalate-laden spinach and chard, which inhibit calcium absorption. "Other calcium-rich foods like tofu, edamame, yogurt, kefir and cheese are also good, as well as milk substitutes fortified with calcium." Omega-3-rich chia seeds, walnuts and other tree nuts are heavy hitters that boost both calcium absorption and collagen production essential for bone strength.

A 2016 Brazilian study published in the *European Journal of Clinical Nutrition* shows that a diet with excessive sweets and caffeinated beverages negatively impacts bone mineral density in postmenopausal women with osteoporosis. Soda consumption also amps up the risk of fractures. An analysis of female subjects spanning 30 years published in *The American Journal of Clinical Nutrition* in 2014 reveals a 14 percent increased risk for fractures with each daily serving of soda, including diet beverages.

Get Moving

High-impact activities like jumping rope and jogging build strong bones in our youth, but as we age, low-impact exercise is easier on the joints. Mayo Clinic recommendations include walking, gardening, dancing, stair-climbing and elliptical training.

Resistance also yields significant results. A 2018 Korean study published in the journal *EnM* reveals that exercise employing free weights, weight machines and elastic bands increases muscle and bone mass in both women and men. American College of Sports Medicine-certified personal trainer Susie Hathaway, in Fairfield, Iowa, explains why. "What's good for muscles is good for bones. When a muscle contracts, it gives a beneficial pull on the adjacent bones, stimulating the bone-building cells to be more active."

Hathaway highlights safety and the importance of bearing weight on the feet. "Gravity is important for bone health. Weight-bearing aerobic exercise, such as brisk walking, provides a mild stimulus for your bones and helps slow down bone loss."

Kuzniar reminds us that with the right care, our bones can carry us through life. "Once we know what factors are at play in the patient, we can address the underlying causes."

Marlaina Donato is an author and composer. Connect at AutumnEmbersMusic.com.

Osteoporosis is astonishingly common in men and women.

Roughly **50%** of American women and **25%** of American men age 50 and older will suffer a **fracture** due to this condition.[1]

These bone breaks are a leading cause of disability. Within a year of suffering a hip fracture, up to **20%** of patients over 50 ***will die***.[2]

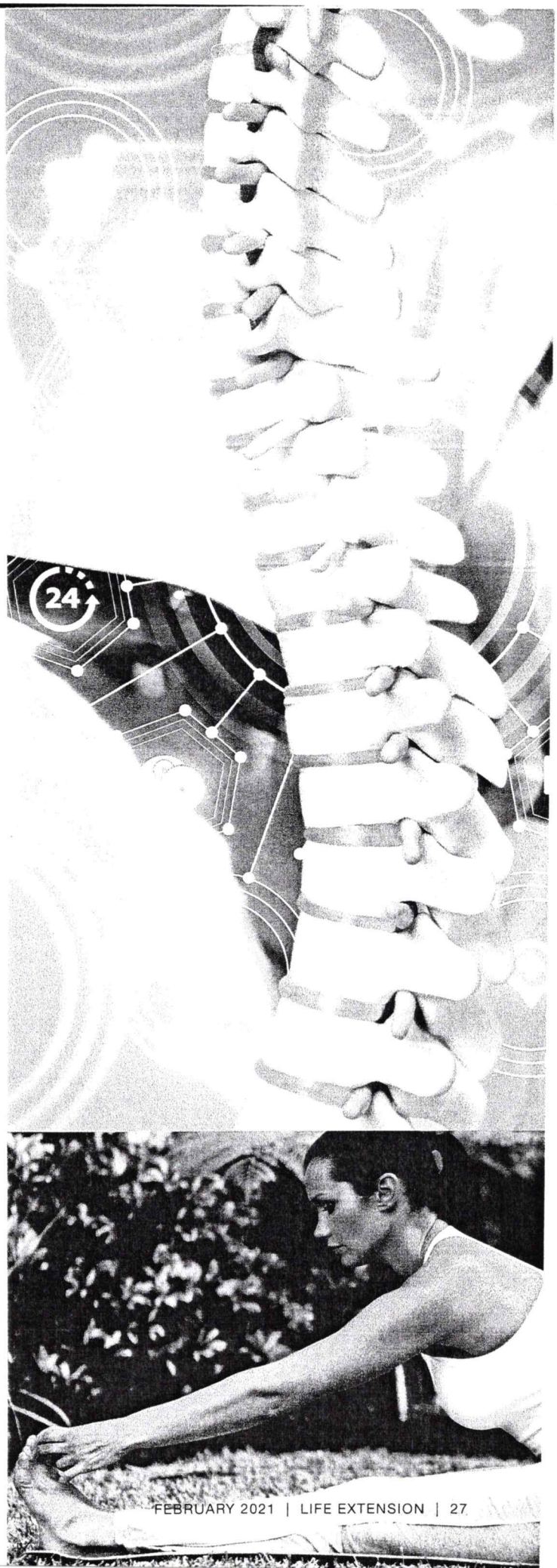
For decades, doctors in Japan have been using **high doses** of **vitamin K2** as a prescription drug to prevent ***bone loss*** and protect against **fractures**.[3]

It is now available in the U.S. *without* a prescription.

Clinical trials have demonstrated that **45 mg** of **vitamin K2 (menaquinone-4)** helps to:[4-11]

- Slow bone loss,
- Reduce fracture risk, and
- Build *new* bone.

A two-year study of older osteoporosis patients showed that high-dose vitamin K2 cut the number of people suffering a **vertebral** fracture by **<u>half</u>**.[11]



Oral Collagen Improves Skin *and* Joint Health

BY JOHN COOPER

Collagen makes up about **one-third** of all protein in the body.[1]

In the **skin** and **joints**, collagen provides structural support, strength and resiliency.

In youth, damaged collagen is continually **repaired** and **replaced**.

But with age, the body's ability to replenish collagen stores declines by about **1.5% each year**.[2]

This loss of collagen is a major contributor to skin aging and loss of joint function.

Whole collagen is a large, complex protein that cannot be easily digested or absorbed into the body.

But scientists have discovered that *partially broken-down* collagen—known as **hydrolyzed collagen**—is highly **absorbable**.

Consumed orally, **hydrolyzed collagen** stimulates the production of new collagen in the skin and joints.[3-5]

What Is Collagen?

There are **connective tissues** throughout the body, in the skin, bone, cartilage, tendons, ligaments, and more. They give structure, strength, and support to tissues.

All connective tissues have protein fibers within them that influence the mechanics and strength of that tissue. **Collagen** makes up a large proportion of these fibers.

In humans, most of the collagen is present in three forms:[2]

- **Type I collagen** is especially prevalent in the skin, where it makes up over **80%** of all collagen. This collagen is the reinforcement structure of connective tissues. It has great tensile strength, resisting stretching and tearing. It is also prevalent in bone, tendons, and ligaments.
- **Type II collagen** is primarily found in cartilage, the connective tissue that protects the bones at the joints.
- **Type III collagen** is found in skin, cartilage, blood vessels, and throughout many other soft tissues.

Collagen is produced primarily by connective tissue cells called **fibroblasts** and by cartilage cells called **chondrocytes**.

But they produce *less* collagen as we age, gradually declining at a rate of about **1.5%** per year.[2]

In the skin, this loss of collagen has immediate, visible effects. Skin loses elasticity and strength, leading to sagging, fine lines, and wrinkles.[6]

In joints, age-related changes in the collagen structure means articular cartilage no longer functions effectively. This contributes, in part, to the joint stiffness and the movement limitations characteristic of patients with **osteoarthritis**.[8]

How Oral Collagen Works

Whole collagen is difficult to digest and too large to be absorbed into the body.

But scientists have found that if the collagen is prepared in such a way that it is *already* broken into fragments, as much as **95%** of it can be absorbed and distributed to tissues throughout the body.[2,9]

Collagen formulated in this manner is known as **hydrolyzed collagen**. Once these collagen pieces reach the skin or cartilage, they stimulate repair and rejuvenation of tissues.

Researchers have identified at least two different mechanisms by which this happens:

- Collagen fragments directly activate **fibroblasts** and **chondrocytes**, stimulating them to *increase* their production of collagen and other connective tissue components.[2-5]
- **Immune system** cells recognize the collagen fragments and activate a process that stimulates fibroblasts, further energizing their production of collagen and other connective-tissue proteins.[7]

In **skin**, this improves age-related skin changes, increasing skin hydration and elasticity while reducing fine lines, wrinkles, and dryness.[7]

In **joints**, chondrocytes are stimulated to repair and replace damaged collagen, leading to less pain and greater mobility.[3]

Healthier, Younger-Looking Skin

Many clinical trials have assessed the ability of **oral collagen** to improve skin health and appearance. In just the last two years, a number of reviews have summarized their findings.[7,10,11]

The vast majority of published studies have found that skin appearance and markers of skin health are improved after oral intake of collagen.[7]

Collectively, these studies show that collagen intake results in:

- Improved skin **hydration**,
- Improved skin **elasticity** (the ability to stretch and bounce back without sagging),
- Improved skin texture and condition, and
- Reduction of lines and wrinkles, including crow's feet.

Oral collagen also benefits the **nails**, improving flexibility and texture.

One joint Korean and Japanese study published in the journal *Nutrients* evaluated the use of **hydrolyzed collagen peptides** (short chains of amino acids that provide the building blocks for collagen) in adult women.[12]

Subjects were randomized to receive either the collagen or a placebo. After six weeks, measurements of **skin hydration** in the **collagen** group were **7.23-fold** greater than the **placebo** group.

By week 12, the visual improvement in **skin wrinkles** was **10.5-fold** greater in the collagen group than in the placebo group. Skin **elasticity** also improved significantly in the collagen group.

Other similar studies have shown comparable findings.[2,7,10]

Several studies have evaluated collagen intake for skin conditions, including dryness, cellulite, and skin ulcers (open sores that don't heal properly).[10]

For all these conditions, oral **hydrolyzed collagen** has a positive impact. It accelerates skin healing, improves skin hydration, reverses signs of skin aging, and reduces cellulite.

Collagen and Joint Health

Joints are structures where two or more bones meet.

Cartilage keeps joints like the knee, elbow, fingers, shoulder, and hip working through a full range of motion without pain. This lubricated, rubber-like tissue lines the ends of the bones, cushioning them so that they can glide over each other smoothly without damaging each other.

With wear and tear, **joint cartilage** breaks down. Over time, it becomes thin, rough, and cracked, and can even erode completely, leaving bone on bone.

This condition is referred to as **osteoarthritis**, the most common form of arthritis. It results in inflammation, pain, and significant reduction in the range of motion of joints.

Osteoarthritis is a major source of chronic pain and disability in older adults. Knee osteoarthritis is the most common condition leading to surgical joint replacement.[13]

Collagen is vital to the structure and health of **cartilage**, along with other supportive structures around joints, such as ligaments and tendons.

Hydrolyzed collagen has been shown to protect cartilage and repair it in an animal model of osteoarthritis, and to improve measures of osteoarthritis severity and quality of life in a clinical trial.[14,15]

In a mouse model of osteoarthritis, hydrolyzed collagen increased total cartilage area, increased the number of chondrocytes producing cartilage, and increased the **extracellular matrix**, which can be thought of as the scaffolding for surrounding tissues.

All of these benefits led to preserved cartilage volume and function.[14] At the same time, it was associated with a reduction in signs of painful **inflammation** in the joint.

WHAT YOU NEED TO KNOW

Collagen for Healthy Skin and Strong Joints

Collagen is the most prevalent protein in the body.

Collagen lends strength and resilience to many tissues, including the **skin** and **joints**.

With age, collagen production drops. In skin, this contributes to dryness and wrinkles. In joints, this leads to dysfunction and, over time, **osteoarthritis**.

Oral collagen that has been partially broken down, known as **hydrolyzed collagen**, is easily absorbed into the body and distributed to tissues.

Human studies have found that hydrolyzed collagen improves markers of skin aging and health, improving **hydration** and **elasticity** while reducing fine lines and wrinkles.

Collagen has also been found to stimulate **cartilage** repair in joints, improving range of motion and reducing pain.

Collagen has also been tested in **human** subjects.

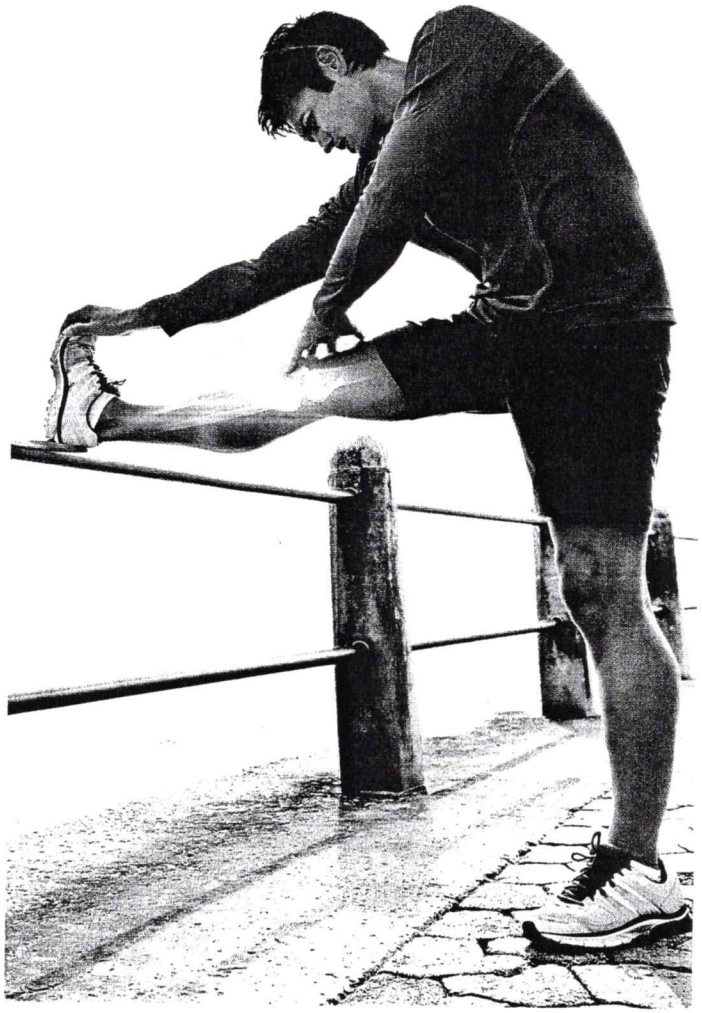
A randomized, controlled trial evaluated the use of **collagen peptides** in patients suffering from **osteoarthritis**.[15] Subjects receiving placebo had no change in the severity of their symptoms, including pain. But those receiving collagen had significant **reduction in pain**.

Individuals taking collagen also had improvements in other symptoms, like stiffness, physical function, and quality of life.

Summary

Collagen is the most prominent protein in the body. It gives form and strength to various tissues, including the **skin** and **joints**.

Collagen production declines with advancing age. In the skin, that leads to dryness and wrinkles. In joints, it causes a breakdown in cartilage that can result in **arthritis**.



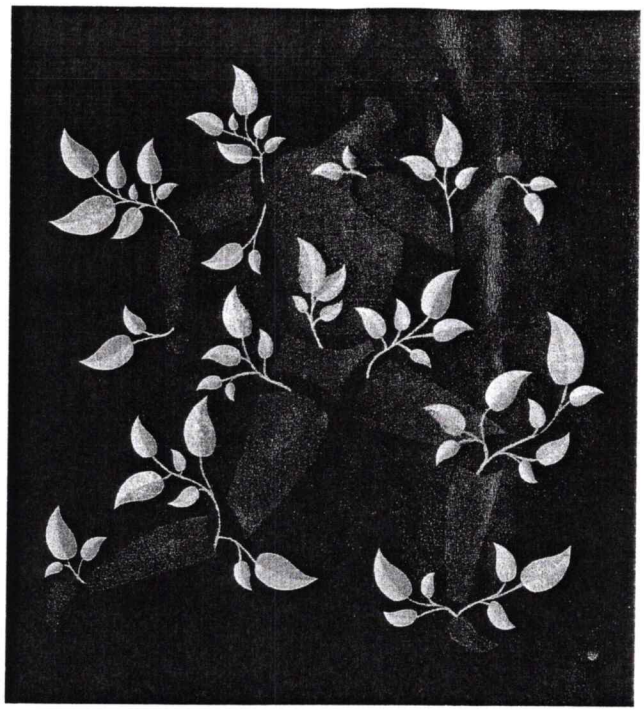
A partially broken-down collagen, known as **hydrolyzed collagen**, is highly absorbable and can reach the skin and joints. There, it stimulates collagen production and improves the overall health and youthfulness of these tissues.

Clinical trials have demonstrated that intake of **hydrolyzed collagen** results in younger-looking skin, improving hydration and reducing wrinkles, while protecting joints and improving their function. •

If you have any questions on the scientific content of this article, please call a **Life Extension®** Wellness Specialist at 1-866-864-3027.

References

1. Alcock RD, Shaw GC, Burke LM. Bone Broth Unlikely to Provide Reliable Concentrations of Collagen Precursors Compared With Supplemental Sources of Collagen Used in Collagen Research. *Int J Sport Nutr Exerc Metab.* 2019 May 1;29(3):265-72.
2. Sibilla S, Godfrey M, Brewer S, et al. An Overview of the Beneficial Effects of Hydrolysed Collagen as a Nutraceutical on Skin Properties: Scientific Background and Clinical Studies. *The Open Nutraceuticals Journal.* 2015 03/04;8(1):29-42.
3. Oesser S, Seifert J. Stimulation of type II collagen biosynthesis and secretion in bovine chondrocytes cultured with degraded collagen. *Cell Tissue Res.* 2003 Mar;311(3):393-9.
4. Postlethwaite AE, Seyer JM, Kang AH. Chemotactic attraction of human fibroblasts to type I, II, and III collagens and collagen-derived peptides. *Proc Natl Acad Sci U S A.* 1978 Feb;75(2):871-5.
5. Torita A, Miyamoto A, Hasegawa Y. The effects of scallop shell extract on collagen synthesis. *Fisheries Science.* 2007 2007/11/01;73(6):1388-94.
6. Czajka A, Kania EM, Genovese L, et al. Daily oral supplementation with collagen peptides combined with vitamins and other bioactive compounds improves skin elasticity and has a beneficial effect on joint and general wellbeing. *Nutr Res.* 2018 Sep;57:97-108.
7. Barati M, Jabbari M, Navekar R, et al. Collagen supplementation for skin health: A mechanistic systematic review. *J Cosmet Dermatol.* 2020 May 21.
8. Hügle T, Geurts J, Nüesch C, et al. Aging and osteoarthritis: an inevitable encounter? *Journal of aging research.* 2012;2012:950192-.
9. Oesser S, Adam M, Babel W, et al. Oral administration of (14)C labeled gelatin hydrolysate leads to an accumulation of radioactivity in cartilage of mice (C57/BL). *J Nutr.* 1999 Oct;129(10):1891-5.
10. Choi FD, Sung CT, Juhasz ML, et al. Oral Collagen Supplementation: A Systematic Review of Dermatological Applications. *J Drugs Dermatol.* 2019 Jan 1;18(1):9-16.
11. Lupu MA, Gradisteanu Pircalabioru G, Chifiriuc MC, et al. Beneficial effects of food supplements based on hydrolyzed collagen for skin care (Review). *Exp Ther Med.* 2020 Jul;20(1):12-7.
12. Kim DU, Chung HC, Choi J, et al. Oral Intake of Low-Molecular-Weight Collagen Peptide Improves Hydration, Elasticity, and Wrinkling in Human Skin: A Randomized, Double-Blind, Placebo-Controlled Study. *Nutrients.* 2018 Jun 26;10(7).
13. Available at: https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/knee-replacement-surgery-procedure. Accessed September 22, 2020.
14. Dar QA, Schott EM, Catheline SE, et al. Daily oral consumption of hydrolyzed type 1 collagen is chondroprotective and anti-inflammatory in murine posttraumatic osteoarthritis. *PLoS One.* 2017;12(4):e0174705.
15. Kumar S, Sugihara F, Suzuki K, et al. A double-blind, placebo-controlled, randomised, clinical study on the effectiveness of collagen peptide on osteoarthritis. *J Sci Food Agric.* 2015 Mar 15;95(4):702-7.



Regenerating Damaged Joints

New research on arthritis and cartilage opens up growing possibilities

By Claudia Wallis

"Cartilage doesn't heal." That's what doctors often tell us when we injure the flexible tissue that lines our hips, knees and shoulders or when osteoarthritis has eroded it so that our joints hurt when we move. I've certainly heard it myself from orthopedic surgeons who explain that cartilage has no blood supply to bring repair cells and nutrients to an injury site. Yet it's always struck me as improbable that a living tissue could not replace damaged cells. As it turns out, recent research suggests that articular cartilage—the type in our joints—does have some limited repair capacity. New insights into this ability are raising hopes for treatments that could enhance healing or protect damaged cartilage from further deterioration.

To picture articular cartilage, envision the tough, white coating on the end of a chicken bone. Most of it is a spongy material called extracellular matrix, a mixture of water and fibrous proteins pumped out by cells called chondrocytes. "There is intrinsic regeneration—with new tissue being formed and old tissue chewed up and washed away—just as there is for every tissue with the exception of tooth enamel," explains rheumatologist Virginia Kraus of the Duke University School of Medicine. But, she emphasizes, the renewal process in cartilage is sluggish. And it is true that in adults the tissue has no blood supply. Instead cartilage gets help from what experts call dynamic loading—putting stress or weight on the joint, which causes nutrient-carrying synovial fluid to flow in and out. "That's why exercise is so critical to joint health," Kraus notes. "The way you get nutrients to cartilage is through movement."

Claudia Wallis is an award-winning science journalist whose work has appeared in the *New York Times*, *Time*, *Fortune* and the *New Republic*. She was science editor at *Time* and managing editor of *Scientific American Mind*.

Kraus is one of a small number of scientists who studies the slow turnover in this tissue. In a surprising discovery, she and her team reported in 2019 that the production of proteins associated with repair and regeneration differs by joint: It is greater in the ankle than in the knee and greater in the knee than the hip. Kraus refers to this gradient as "our inner salamander," explaining that in salamanders and other animals that can regenerate a lost limb, this capacity is more robust in the foot than higher up in the leg.

Her study also showed that genetic material associated with repair is more abundant in arthritic joints than healthy ones. Just as a limb injury launches a repair program in a salamander, osteoarthritis is turning it on in humans, Kraus suspects, although "obviously the program we have is not sufficient." Still, the repair process may be working in the ankle, which, she notes, is far less prone to severe arthritis than the knee or hip.

There is other evidence that human cartilage can regenerate. A procedure called joint distraction is being tested as a way to promote healing in patients who have bone-on-bone knee arthritis and are too young to be good candidates for total knee replacement. (Prosthetic knees last 15 to 20 years, after which they must be replaced in a complex surgery.) The procedure involves placing pins above and below the knee and using an external device for six weeks to separate the upper and lower leg bones by five millimeters. This opens up the joint space. Patients are encouraged to walk, but the device reduces stress, so the knee is bathed in nutrient-laden fluid without being overburdened.

Dutch researchers have shown that the procedure leads to a small increase in cartilage in the joint and less pain—benefits that last at least two years and as many as 10 in some patients. Larger clinical trials of the technique are needed, "but it's a fascinating model," says rheumatologist Philip Conaghan of the University of Leeds in England.

Conaghan investigates new drugs for arthritis, including a growth factor called sprifermin that appears to slow the loss of cartilage in some patients. He is also looking at canakinumab, an inflammation inhibitor that was tested as a cardiovascular drug and showed a surprising side effect: dramatically fewer joint replacements in recipients than in a placebo group. But Conaghan warns that the quest for drugs that can thicken cartilage is a tough one because of the slow and uncertain nature of repair: "The change is so small, and it's hard to pick it up, even with the best imaging."

For now, strength-building exercise remains the best strategy for those of us with fraying joints. Conaghan recommends walking in a swimming pool. "Strong quads reduce knee pain a lot, no matter what you've got going on," he says. "All of life is about strong muscles."

Illustration by Fatinha Ramos

Patient information: Bone density testing (Beyond the Basics)

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WHAT DOES BONE DENSITY TESTING DO AND WHY IS IT IMPORTANT?

People tend to think that bones are static and unchanging, but the truth is that bones are in constant flux. Even as you read this sentence, specialized cells in your body are busy destroying old bits of bone and replacing them with new bone. Unfortunately, as people age, they often lose bone more quickly than they can replace it, so their bones can become porous and brittle (figure 1).

If left unchecked, this bone loss can lead to a disorder called osteoporosis, defined as reduced bone mass and poor bone quality. The disorder makes bones weak and prone to fracture. People who have osteoporosis have bones that can break with even the mildest impact. For example, people with osteoporosis can break a bone just from a minor fall, such as tripping on a loose rug in the living room.

Each year in the United States, osteoporosis leads to 1.5 million fractures, including:

- 700,000 fractures of the vertebrae, the bones in the spine
- 300,000 hip fractures
- 250,000 wrist fractures, and
- 250,000 fractures of other parts of the body

Fractures of the spine and hip can lead to chronic pain, deformity, depression, disability, and even death. Plus, half the people who break a hip never regain the ability to walk without assistance and a quarter need long term care.

The problem is that osteoporosis does not cause any symptoms, so people do not usually know they have the condition until they break a bone unexpectedly. That's where bone density tests come in.

Bone density tests measure how strong the bones are. Healthcare providers use these tests to both screen for and diagnose osteoporosis. The tests are important, because they can alert you to problems with your bones before you have a fracture.

If it turns out that you have osteoporosis or are at risk for it (known as low bone mass or osteopenia), you can take steps to prevent fractures. (See "Patient information: Osteoporosis prevention and treatment (Beyond the Basics)".)

WHO SHOULD GET BONE DENSITY TESTING?

Osteoporosis targets women much more often than men, and it becomes more common after menopause and with advancing age. As a result, healthcare providers recommend bone density testing for women who have been through menopause and are at least 65 years old. In addition, there are

certain characteristics that put people at higher risk for fracture, so healthcare providers sometimes recommend testing in men or women younger than 65 years who have one or more risk factors. (See "Screening for osteoporosis".)

Risk factors for fracture — Factors that increase a person's risk of fracture and may lead to earlier bone density testing include:

- Cigarette smoking
- Long-term use of steroid (glucocorticoid) medications such as prednisone
- Low body weight (less than 127 lbs or 58 kg)
- Rheumatoid arthritis
- History of a non-traumatic or low trauma bone fracture in self or parents (eg, breaking a bone after falling from standing height or less)
- Excessive alcohol consumption (three or more servings a day)
- A disorder strongly associated with osteoporosis, such as diabetes, untreated hyperthyroidism, hyperparathyroidism, early menopause, chronic malnutrition or malabsorption, or chronic liver disease

WHICH TEST IS BEST?

There are several different types of bone density tests.

Dual-energy x-ray absorptiometry — Experts agree that the most useful and reliable bone density test is a specialized kind of x-ray called dual-energy x-ray absorptiometry, or DXA. DXA provides precise measurements of bone density at important bone sites (such as the spine, hip, and forearm) with minimal radiation.

We recommend DXA of the hip and spine because measurements at these sites are the best at predicting who will have an osteoporotic fracture, at identifying who should be treated for osteoporosis, and at monitoring response to treatment.

If you are unable to lie on an examination table, it will not be possible to measure your spine and hip bone density. Instead, you can sit beside the DXA machine for a scan of your forearm. When the hip and spine cannot be measured, the diagnosis of osteoporosis can be made using a DXA measurement of the forearm. If you have a condition known as hyperparathyroidism or have an overactive thyroid (hyperthyroidism), the forearm should also be measured (in addition to the spine and hip) because the bone density at the forearm may be lower than at the hip with these conditions.

If you have a DXA study done, make sure that your doctor gets all the DXA measurements, not just a summary statement. These measurements can hold important clues that are not always on the summary statements.

If your doctor recommends a follow-up DXA (usually two years or more between studies), try to have the follow-up study done at the same facility as the first one. There are different models of DXA instruments, and the bone density measurements are easier to compare if they have been taken on the same model.

Quantitative computerized tomography — This is a type of computed tomography (CT) that provides accurate measures of bone density in the spine. Although this test may be an alternative to DXA, it is seldom used because it is expensive and requires a higher radiation dose.

Ultrasonography — Ultrasound can be used to measure the bone density of the heel. This may be useful to determine a person's fracture risk. However, it is used less frequently than DXA because there are no guidelines that use ultrasound measurements to diagnose osteoporosis or predict fracture risk. In areas that do not have access to DXA, ultrasound is an acceptable way to measure bone density.

WHAT TO EXPECT FROM A DXA TEST

During dual-energy x-ray absorptiometry (DXA), you lie on an examination table. An x-ray detector scans a bone region, and the amount of x-rays that pass through bone are measured and displayed as an image that is interpreted by a radiologist or metabolic bone expert. The test causes no discomfort, involves no injections or special preparation, and usually takes only 5 to 10 minutes. The x-ray detector will detect any metal on your clothing (zippers, belt buckles), so you may be asked to wear a gown for the test.

The amount of radiation that's used is minimal, amounting to roughly the same radiation that an average person gets from the environment in one day. After the test is completed and the doctor interprets the results, you will be given a score that speaks to the condition of your bones.

WHAT DO THE RESULTS MEAN?

The results of a bone density test are expressed either as a "T" or a "Z" score. T-scores represent numbers that compare the condition of your bones with those of an average young person with healthy bones. Z-scores instead represent numbers that compare the condition of your bones with those of an average person your age. Of these two numbers, the T-score is usually the most important. T-scores are usually in the negative or minus range. The lower the bone density T-score, the greater the risk of fracture (table 1).

Normal bone density — People with normal bone density have a T-score between +1 and -1. People who have a score in this range do not typically need treatment, but it is useful for them to take steps to prevent bone loss, such as having adequate amounts of calcium and vitamin D and doing weight-bearing exercise. (See "Patient information: Osteoporosis prevention and treatment (Beyond the Basics)".)

Low bone mass (osteopenia) — Low bone mass (osteopenia) is the term healthcare providers use to describe bone density that is lower than normal but that has not yet reached the low levels seen with osteoporosis.

A person with osteopenia does not yet have osteoporosis, but is at risk of developing it. People with osteopenia have a T-score between -1.1 and -2.4.

In you have other risk factors for fracture (see 'Risk factors for fracture' above), and have a T-score in the osteopenic range, you may be at high risk for fracture. People with low bone mass are usually advised to take steps to prevent osteoporosis. Sometimes that includes taking medications. (See "Patient information: Osteoporosis prevention and treatment (Beyond the Basics)".)

Osteoporosis — People with osteoporosis have a T-score of -2.5 or less. Larger numbers (eg, -3.2) indicate lower bone density because this is a negative number.

The lower the bone density, the greater the risk of fracture. If you discover that you have osteoporosis, there are several things you can do to reduce the chances that you will break a bone. For instance, you can take osteoporosis medications combined with calcium and vitamin D supplements, and you can do an exercise program. (See "Patient information: Calcium and vitamin D for bone health (Beyond the Basics)" and "Patient information: Osteoporosis prevention and treatment (Beyond the Basics)".)

Fracture prediction tool — Fracture Risk Assessment Tool (FRAX) is an on-line tool (http://www.shef.ac.uk/FRAX) that was developed by the World Health Organization (WHO) to predict your 10-year likelihood of having a minimal trauma fracture. You can use it to determine your fracture risk even if you have not had a dual-energy x-ray absorptiometry (DXA) test, but you will get a more accurate prediction if you include DXA results. If you decide to use the FRAX tool on your own, without a DXA study, and the results indicate a high risk of fracture, it is good to also have a DXA test. This DXA will serve as a baseline by which your doctor can follow your response to treatment.

The FRAX tool should only be used the first time you and/or your doctor decide that it is time to evaluate your bone health and risk of fracture. FRAX should not be used if you have already had a minimal trauma fracture or are already on treatment aimed at preserving your bone health and preventing future fractures.

DO I NEED TO HAVE BONE DENSITY TESTING AGAIN?

Even if your bone density test shows that you do not have osteoporosis today, you may need to have the test again. How long to wait between tests depends on your initial bone density results and whether you have risk factors that represent an ongoing threat to your bones.

- If initial bone density testing shows you have a T-score of -2.00 to -2.49 at any site, or if you take medications that decrease bone density, or have medical conditions that can adversely affect the bones, experts recommend repeat bone density testing every two years.

  Other people may also need repeat bone density testing every two years. This includes people who have osteoporosis and begin taking medications to stall further bone loss or to stimulate new bone growth. The results of the follow-up tests are used to monitor the effects of the treatment.

- In women 65 years of age and older at baseline screening, with a T-score of -1.50 to -1.99 at any site, and with no risk factors for accelerated bone loss, we will typically perform a follow-up dual-energy x-ray absorptiometry (DXA) in three to five years.

- In women 65 years of age and older at baseline screening, with normal or slightly low bone mass (T-score -1.01 to -1.49), and with no risk factors for accelerated bone loss, we will typically perform a follow-up DXA in 10 to 15 years.

Repeat bone mineral density (BMD) measurements may be most valuable for patients who are taking a medication to treat osteoporosis to determine the efficacy of treatment and for patients who are not being treated but have medical conditions that can cause bone loss to determine if they need treatment.

SUMMARY

Bone density tests help healthcare providers spot bone loss in people who might otherwise have no symptoms. The tests are painless, quick, and safe, and can alert people to bone loss before they have a fracture. The tests are also useful in tracking the effects of medications used to manage bone disease.

New Breakthroughs in the Treatment of Osteoporosis

Osteoporosis affects 28 million Americans. Two-thirds of its victims are women, making it more prevalent than breast, uterine, and ovarian cancer combined. And, as with these cancers, it can kill you.

With osteoporosis, bones become increasingly fragile. If left untreated, *osteoporosis can progress painlessly until a bone breaks.* These broken bones are usually fractures of the hip, spine, or wrist.

While as many as one-fifth of its victims end up in nursing homes, *and 50,000 die each year from post-fracture complications,* osteoporosis can be prevented with proper nutrition. Through proper diet, women can stave off osteoporosis, especially if they start early. Young people need to build and bank bone for their old age, just as they might stash away money for their eventual retirement.

If you are over 40, female, petite, Caucasian, drink a lot of Pepsi, Coke, or other phosphate drinks that are high in sugar, you are a serious candidate for osteoporosis.

According to the latest study from UCLA, "almost 40 percent of women over 45 never discuss osteoporosis with their physicians — *and fully 92 percent do not know that collapsing bones in the spine, called compression fractures*, are the most common consequence."

Osteoporosis leads to 700,000 spinal fractures, 300,000 hip fractures, and 200,000 wrist fractures every year. *Most of these can be prevented*, which is what this report is all about.

You Can Have Strong Bones Without Fosamax or Estrogen!

A semi-obscure study has discovered that you can strengthen your bones and avoid osteoporosis without the use of conventional medicine's two osteoporosis darlings — Fosamax and estrogen.

Better yet, you can do it without the expense of doctor-administered therapies or unwanted side effects!

And the news gets even better — whether you're male or female, you can also give yourself better overall health with this same treatment. It's perfectly safe and desirable for everyone!

I've warned about the dangers of estrogen for years. Now, at last, estrogen has struck out completely. It's been shown to expose users to greater risks of cancer and even heart disease.

It appears that estrogen therapy is good for ... well ... nothing! After decades of profiteering, lies, and gross negligence by doctors and industry, the truth has finally come out.

You may already know that the bone is a place of constant remodeling. It continually adjusts to and repairs micro trauma from mechanical stresses. Healthy bone needs both old bone resorption and new bone creation.

You also know that osteoclasts, cells that resorb old bone, become more active in menopausal-associated osteoporosis. Osteoblasts, on the other hand, are cells that lay down new bone. Biphosphonate drugs, like Fosamax, may exert their action by killing off osteoclasts. Hence,

your bones resorb less old bone. But the remaining bone, while denser, may be brittle and weak (not enough osteoblasts). Excess osteoclast activity resorbs bone faster than it can be created. Remember, the key word is excess. You must have balanced bone resorption and creation for healthy bones. Fosamax creates an unbalanced environment, which means you can't have healthy bones.

I doubt the drug manufacturers will take heed the fantastic study I'm about to reveal here. There's no profit in it for them. Yet herein might be the clues and answers for you to further manage the age-old problem of estrogen-deficiency bone loss, and take control back from the corrupt sickness industry!

How estrogen protects bones is uncertain, but a team from London reveals at least one reason and a simple method of counteracting the problem. The group of researchers found that the levels of two major sulfur-bearing antioxidants, glutathione (one of my favorite nutrients) and thioredoxin, fell dramatically in rats after their ovaries were removed (oophorectomy).

Additionally, glutathione and thioredoxin reductases, the enzymes responsible for regenerating these specific antioxidants, also fell sharply. However, levels of the re-generating enzymes and the antioxidants themselves all rapidly returned to normal with administration of estrogen.

But, more importantly, the researchers looked at an alternative to estrogen to stop the bone loss. They administered nutritional precursors of glutathione and found that these abolished the bone loss from oophorectomy.

To prove the glutathione link to bone loss, they also administered a specific inhibitor of glutathione synthesis (totally unrelated to hormones), which induced substantial bone loss.

Then they finished up their report by looking at osteoclast-like cells in the lab that were fed N-acetylcysteine (NAC — a nutritional supplement which raises glutathione levels). They found NAC blocks the ability to manufacture specific cytokines (white blood-cell hormones) that stimulate bone loss and also prevent the overproduction of osteoclasts.

The conclusions from this brilliant study are that estrogen, at least in great part, prevents bone loss by stimulating formation of active sulfur-based antioxidants in bone osteoclasts. Adequate levels of these special antioxidants inhibit osteoclast production and overactivity, but doesn't harm them, like chemical drugs might. In fact, the nutrients exerted the same bone-sparing effect of estrogen, even in animals whose ovaries had been totally removed.

The nutrients just keep osteoclast function in proper *balance*, and evidently through the same mechanism as estrogen. When estrogen is withdrawn, osteoclasts spin out of balance because the body loses its ability to manufacture these specific protective antioxidants in these cells. This provides you with a fantastic opportunity to nutritionally restore balance in these important cells without using drugs or hormones!

I've added this regimen (NAC, alpha lipoic acid, and additional vitamin C) to my osteoporosis patients. You may consider the same. I've never seen any undesired reaction to this combination of nutrients.

Undenatured whey protein can raise your glutathione levels as well. This product is available at most health food stores and provides ample amounts of the critical amino acid precursors necessary for glutathione production. My favorite is a brand called Imuplus (one packet daily) and is available from Nutritional Research at 877-341-2703.

I generally use NAC at 500 mg, three times daily; ALA at 100 mg, three times daily or 300 mg, once daily of the sustained release; and vitamin C at 4,000-6,000 mg daily. If you take Imuplus, the dosage is one to two packets daily.

Ref: *Journal of Clinical Investigation,* September 2003.

Beyond Calcium — A Better Nutrient for Fighting Osteoporosis

You already know about calcium. You already know about magnesium. You

also know about vitamin D. All of these are vital for preventing and treating osteoporosis. But now there's an even better weapon you can use to fight this terrible disease.

Do you remember strontium from the days of atmospheric nuclear testing? Those blasts created a dangerous radioactive isotope of strontium called strontium 90. We were repeatedly warned about strontium 90 and its relationship to cancer, especially bone cancer and leukemias (which arise in bone marrow). Strontium 90 isn't something you want around.

If you look at a periodic table of the elements, you will find vertical groups of elements. These groups have very similar electrochemical properties. The element strontium lies just below calcium, which lies just below magnesium, all in the second vertical column of the chart. You already know of the very strong relationship between calcium and magnesium. But strontium acts far more like calcium than does magnesium — in fact, they're almost interchangeable — which makes strontium a powerful nutrient for osteoporosis treatment and prevention.

Nuclear generated strontium 90 is radioactive. Its fallout on pastureland was picked up by dairy cattle. Their systems would process it just like calcium and dump it into their milk, putting unwary humans at risk. Our systems would see it similar to calcium and store it in bone, where it causes cancer. Fortunately, atmospheric nuclear tests have ended and, thus, the threat of strontium 90. But the real strontium story, the nutritional aspects of the naturally occurring mineral (not the radioactive stuff), is just beginning to grow, and has the potential to "nuke" the osteoporosis industry.

At a recent meeting, my friend and famed nutritionist, Jonathan Wright, MD presented some information on the trace mineral strontium that caught my attention to explore further.

Osteoporosis by definition is the loss of minerals (particularly calcium) in the bone. The mineral loss causes bone to weaken and break. But the hardness of your bones is only half the story. The other half is called the protein matrix of bone, which refers to how flexible your bones are.

Vital Nutrient for Bone Health

Vitamin K: Few people even know about vitamin K, but it is incredibly important in the treatment of osteoporosis, as it inhibits the loss of calcium from bone and is an absolute requirement to get calcium into bones.

Women aren't the only ones who suffer from bone loss. It's also a big problem for astronauts on extended missions. In fact, astronauts lose between .3-.4 percent of their bone mass each month they're in space. That's five times faster than post-menopausal women.

Recently, a team of scientists from Jean Monet University in France studied cosmonauts on the Russian space station Mir. They measured levels of free osteocalcin, a protein that binds to calcium and builds bones. The smaller the number, the better. Within four days of being placed into orbit, both cosmonauts showed a dramatic rise in loose levels of this protein. That means calcium wasn't reaching their bones.

But when one cosmonaut was given vitamin K during part of his mission, he was able to bring osteocalcin back to pre-flight levels! And here's an interesting fact: Once the vitamin doses ceased, the free osteocalcin levels went up again and stayed that way for the rest of the mission.

If you have osteoporosis, or if you have a family history of osteoporosis, are small-boned, petite, over 40, and a white or oriental female, then you should consider taking vitamin K. Vitamin K is found in turnip greens, broccoli, lettuce, and beef liver, but consult your doctor before taking the supplements, as vitamin K has to be taken by injection in tiny amounts (start with 100 micrograms) for maximum effectiveness. It can also be found in oral 10 mg tablets, which I have found to be effective for some people.

Hence, bones can break when they become less dense or they become brittle when the protein matrix is fouled. Both problems are related to a loss of minerals in the bones.

Your goal in preventing or treating osteoporosis is to replenish the minerals in your bones. If radioactive strontium accumulates in bone, it goes to reason that the natural element will too. So what is the effect of natural strontium in the bones? It was known by the 1940s that the human body contains lots of strontium and concentrates 99 percent in the teeth and skeleton. Strontium was found to make animal teeth harder and later found to make human teeth healthier and far more resistant to decay.

Back in the 1950s, an article by Drs. E. Schorr and A.C. Carter discussed the findings that strontium, in significant doses, was effective in a wide variety of bone metabolic disorders. The mineral was reported to be without toxic effects (remember, it is extremely similar to calcium), and was highly retained, in contrast to calcium, which is easily lost. Their findings speak for themselves:

"When given in equal amounts, strontium is found to have certain distinct advantages over calcium for the remineralization of the skeleton. There's greater retention of strontium; and when the ceiling for calcium retention has been reached, the addition of strontium results in a retention of the latter." This means that additional calcium is without effect on bone, it's eliminated from the body. However, strontium is retained, even when calcium is not, and will be deposited in bone, adding considerably to its mineral content and, therefore, strength.

The authors added that strontium helps retain calcium, so the total mineral content is increased by combining the two minerals as compared to calcium alone. They also mentioned that maximum absorption of strontium is dependent on vitamin D, estrogens, and androgens, just like calcium.

From this one article, you can see that strontium, for all practical purposes, is handled by your body like calcium, but it's much better absorbed and retained.

Now here's where the story gets even better!

The Mayo Clinic published a report on the case records of 32 osteoporosis patients treated with strontium lactate or strontium carbonate, both of which qualify as nutritional supplements. Hormones were also used. The women were followed with repeated physical and X-ray evaluations (the latter a determiner of the amount of mineral density).

The researchers found 84 percent of the patients' experience "marked subjective improvement." That's an incredible success rate by any standard. While the mechanism was not understood, the authors concluded, "The therapeutic value of the drug appears to be established." Wow, strong words from the prestigious Mayo Clinic.

In another study, the team of researchers knew that adding strontium to the drinking water of rats stimulated bone formation, and that low doses of strontium were being used in treating metastatic bone cancer and osteoporosis. They looked at biopsy samples in six human patients before treatment and after just six months of strontium therapy. All the patients had clinically diagnosed osteoporosis. Each was given 500-700 mg per day of strontium carbonate (similar to the familiar calcium carbonate). No side effects or toxicity were noted.

The results were nothing short of amazing:

- The serum ratio of strontium to calcium increased from 1:1250 (pretreatment) to a stunning 1:12 post treatment.
- Bone strontium to calcium ratios increased from 1:1276 (very similar to pretreatment serum) to 1:166 post treatment.
- Mean bone calcium increased slightly. However, with strontium therapy, all microscopic bone formation parameters increased, while bone resorption remained unchanged. That means the bones weren't losing density.

Unfortunately, conventional medicine refuses to accept anything natural, since it can't patent natural products. So you've probably heard very little about strontium through the years. However, I suspect you'll begin hearing more about it in the near future, as studies on a new synthetic compound are beginning to appear in the medical literature.

In a randomized placebo-controlled, double-blind study involving 72 centers in 12 countries, 1,649 patients were enrolled to receive two grams of strontium ranelate plus calcium and vitamin D (placebos were given calcium plus vitamin D) over a three-year period. The group taking strontium ranelate experienced a 41 percent reduction in their relative risk of suffering their first vertebral fracture. Other positive results included:

- Alkaline phosphatase, a marker of bone metabolic activity, increased in the treated group.
- Lumbar bone mineral density increased 11.4 percent in the treated group compared to a loss of 1.3 percent density in the placebo (calcium) group.
- There were no toxic effects noted, and no deleterious effects of strontium on the rates on non-vertebral fractures.

The authors concluded, "We infer that strontium ranelate is a new orally effective and safe treatment of vertebral osteoporosis with a unique mechanism of action."

Several other studies have shown similar results with strontium ranelate. However, strontium, for decades, has been known to reverse osteoporosis and to be completely safe. Yet it has never been pushed nor studied on a large scale. Why, you ask? The original studies on strontium were with the *naturally* occurring carrier molecules: gluconate, lactate, and carbonate. Ranelate is not natural, but synthetic. Recognize the scam?

The natural salts of strontium obviously cannot be patented. However, the synthetic version, ranelate, is patented. Patent medicine equals money. If you didn't believe that modern medicine is exclusively driven by money and greed before now, this story should fully convince you. Millions of women (and men) have suffered unspeakable ravages of osteoporosis during the same time the drug cartel pushed only dangerous and expensive chemicals our way (such as the Fosamax class of drugs). These have many highly toxic effects and work by poisoning bone-remodeling cells. Thus, bone may be denser but also more brittle. All this happened while a completely safe mineral, studied at Mayo, sat on the shelf simply because it could not be patented.

Action to take: Strontium is found in nature and in foods. However, those with osteoporosis will need more than the mod-

The Real Star in Osteoporosis Prevention and Treatment

If you have osteoporosis, please don't rely solely on the media hype for more calcium. There's much more to osteoporosis than calcium balance. For one thing, you have to get the calcium into bone. Without vitamin K, all the Tums in the world might not do a blessed thing for your bones. But if you have plenty of K, it can make calcium 100 times more effective.

Vitamin K activates a special enzyme in bone, which is crucial to incorporate calcium into the bone matrix. The Framingham study shows that if you are in the lowest group for vitamin K levels in your blood, that you will have twice the risk for fractures! The data came from the ongoing Nurses' Health Study, which followed over 72,000 women between the ages of 58 and 63.

Action to take: Vitamin K is a star nutrient and relatively easy to come by if you eat lots of vegetables. However, the real star is vitamin K2, which is far more active in the enzyme activating process.

est amounts found in whole grains, vegetables, spices, legumes, and seafood.

You can be sure strontium ranelate will be heavily promoted, and at a great cost. But knowing that it's the strontium itself, and NOT the ranelate that provides the benefit, you can avail yourself of this outstanding mineral immediately and at far less cost than a synthetic version. There are several bone formulas with strontium on the market. I recommend Advanced Bionutritionals' Ultimate Bone Support (800-791-3395).

Please be sure you're taking in more dietary calcium per day than supplemental strontium, since calcium is the chief mineral for bone. And be sure you're also taking in other bone supportive minerals and nutrients if you already have osteoporosis.

If your bones are in good shape at this time, and you're interested in osteoporosis prevention, one capsule per day of Ultimate Bone Support will likely lessen any future risk.

New Evidence Shows Lycopene Is Powerful Weapon Against Osteoporosis

Remember lycopene? It's the red pigment in tomatoes known for protecting the prostate. I've just discovered information, in two articles recently published, that this super antioxidant may be yet *another* breakthrough nutrient for bones. One article revealed that lycopene inhibits the activity of osteoclasts, the cells that break down bone. The second article found lycopene able to stimulate osteoblasts, the cells that build bone. A one-two punch!

This is exciting news! We've know for some time that certain nutrients inhibit the effects of inflammation on certain parts of the body. For instance, bilberry greatly protects the retina in your eye from inflammation. Now we know that lycopene does basically the same thing for your bones.

Ref: *Bull Hosp Joint Dis.*, 1952 Apr 13(1):59-66; Osteoporosis Int, 2002, June 13; *J Clin Endocrinol Metab*, May 2002; *Drugs of Today,* February 2003.

Resveratrol — The Super Nutrient That Fights More Than Cancer

I have some incredible stories of how resveratrol can reverse cancer. And I've received letters from many subscribers who have experienced the same results. But the power of resveratrol doesn't stop with cancer. We're now finding out that this incredible red-grape extract is actually a super nutrient that everyone needs to be taking.

In an interesting study from Denmark, researchers confirmed resveratrol's power in treating cancer. But they also inadvertently showed the extract works wonders for osteoporosis.

The researchers focused on multiple myeloma. It's a cancer of the bone marrow. The cancer stimulates bone destruction by activating osteoclasts (bone-dissolving cells) and inhibiting osteoblasts (bone-forming cells). A challenge in myeloma is protecting the bone, as well as targeting the cancer. The Danish team chose to investigate resveratrol's action on both myeloma and bone cells. In previous studies, resveratrol was found to have significant anti-cancer activity.

The authors of the study found that it increased apoptosis (programmed cell death) of the tumor cells. It does this at the DNA level! But what drew my attention was their findings on bone cells. They discovered that resveratrol can stimulate bone marrow stem cells to become osteoblasts rather than osteoclasts. So resveratrol actually enables bones to rebuild!

Resveratrol "further stimulates stem cell response to vitamin D compounds. It does this by getting their DNA to make more vitamin D receptors." The researcher's conclusions took into account only resveratrol's action against cancer, saying, "Taken together, these results suggest that resveratrol or its derivatives deserve attention as potential drugs for treating multiple myeloma."

You don't need to wait for them to make a drug. I've used resveratrol for years in cancer, including myeloma. Some of my patients have seen long-term remission using just oral supplements. I almost always combine resveratrol with a source of vitamin D.

I talk a great deal about the major link between vitamin D deficiency and cancer. And vitamin D is an accepted treatment for osteoporosis. Part of the amazing anti-cancer action of resveratrol may simply be through increasing vitamin D receptors. Thus the benefit in osteoporosis as well.

But the incredible news about resveratrol doesn't stop there. In addition to treating cancer and osteoporosis, resveratrol may also dissolve Alzheimer's plaques.

A new study shows that resveratrol has the ability to reduce the level of beta amyloid in your brain. If you remember, beta amyloid is the plaque material found in the brains of Alzheimer's patients. But the research shows that not only does resveratrol reduce both the secreted and intracellular (inside the cell) goo, but it can actually promote its degradation.

This is big news! Alzheimer's plaque buildup is a medical tragedy with no known mainstream treatment. While this study was in vitro (in the lab dish, not in living patients), I'm excited. Resveratrol has no known downside. It's inexpensive. In short, it's a super nutrient!

I'm excited by both of these reports. I've used resveratrol for years to treat cancer. Now I plan to use it in my osteoporosis protocol and on anyone with memory problems. If you try it for any of these health challenges, please write me and let me know your experience.

Action to take: I strongly suggest you add resveratrol to your supplement regimen. Resveratrol is found in grapes and red wine. I believe a glass a day of organic red wine has wonderful health benefits. But if you're a teetotaler like me, red grapes or supplemental resveratrol might be one of your best friends. There are many products on the market. But make sure you take one made with quality extracts. Two good brands are Life Extension's Resveratrol Caps (800-544-4440) and Advanced Bionutritionals Advanced Resveratrol Formula (800-791-3395). I've used this product for years.

Ref: Marambaud P., H. Zhao, and P. Davies. "Resveratrol promotes clearance of Alzheimer's disease amyloid-beta peptides," *J Biol Chem.*, 2005; 280(45): 37377-82.

The Calcium Hoax Hits Mainstream

"Got Milk?" Reads the ad featuring a painted white-mustached celebrity who earns more from that ad than most of us make in a year. It produces lucrative results. Many of my patients and radio listeners fearfully plead for my blessings on milk and ask, "Where else am I to get calcium?" Seems the marketers have done a great job.

Yes, cow's milk does have calcium, just as grass has magnesium. But does that mean grass or milk benefits humans? Let's examine the research.

An ongoing study at Penn State University started following women at age 12. There was no significant effect on the bone density of these young women through age 20, whether their calcium intake was at the low end of 480 mg or at a high end of nearly 2,000 mg. Lead researcher Thomas Lloyd suggested that young girls' bones do not benefit from more than 500 mg calcium daily. And in countries where calcium intake hovers even less than 300 mg daily (less than 1/3 of average U.S. daily intake), bone fractures are far lower than the U.S.

What, you ask, only 300 mg per day?

It's true! A 2000 American Journal of Clinical Nutrition report stated in the face of all known research, "The conclusion is inescapable that there is no single universal calcium (emphasis added) requirement, only a requirement linked to the intake of other nutrients." And despite this, our Institute of Medicine has upped the recom-

mended calcium intake from 1,000 mg to 1,300 mg for nearly everyone. And this was in the face of a Harvard study showing that women who drank the most dairy products suffered the most fractures. Meanwhile, our tax dollars are funding the federally supported calcium educational campaign "Milk Matters."

Bone density, largely mineral related, contributes only 70 percent to bone strength. The bone matrix, which is made up of protein, determines the remaining 30 percent of bone strength. Thus, some relatively low-density bones with excellent protein matrix may be quite resistant to fracture, while high-density bones with poor protein quality may break! Low bone mass may not always equate or lead to osteoporosis fractures. Could we be using a scary test (bone density) that's not particularly predictive, much like the PSA test for men?

Complementing nutrients, such as magnesium, boron, silicon, vitamin K, and others, are absolutely vital for osteoporosis treatment and prevention.

What needs to be stressed more than anything is the urgent need for physical activity. We know, for example, that astronauts in space rapidly lose bone density. Research shows that bone is constantly going through a process of breakdown and rebuilding. It is physical activity's microtrauma to bone that assists that process. Exercise places a torque on bone (like a wrench on a nut). The effects of the torque are miniscule electrical charges throughout the bone, which stimulate osteoblasts (the bone-forming cells) to action.

Truth is, you could be taking calcium supplements all day long, but without the subtle electrical stimulation of the bone formers through exercise, the osteoblasts would have no stimulation to pick up the available calcium. Research is showing those younger women who exercise will have 10 percent higher bone density than couch potatoes.

A good physician modifies his strategy in the face of experience or new information. Considering well-done published research, my recommendation is to rely far more on exercise for maintaining bones than calcium. More than enough terrific useable calcium (without supplements) is available in the vegetable-based diet I heartily recommend. Avoidance of high phosphate substances (like colas), caffeine, and alcohol, which either tie up or increase calcium elimination, is prudent for everyone. With the present data, I still believe a bone density test is valuable as a woman approaches menopause, and then again a few years later to look at the rate of bone loss. However, I don't take much stock in the static density of a single test and, therefore, don't recommend annual testing. If your doctor puts too much stock in an annual test, he may recommend one of the new osteoporosis drugs, like Fosamax, which you should avoid at all cost.

The National Women's Health Network has declared, "Osteoporosis is not a disease, but simply one risk factor for bone fracture, in the same way that high cholesterol is one risk factor for heart disease." It's prudent to address all risk factors if known. So please get your body outdoors into the sun and torque your bones. The returns on this free investment will be far greater than any returns you find in the stock market.

FROM — Second Opinion: Healing Volume 2
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Medical Hypotheses
Volume 66, Issue 4, 2006, Pages 858-859

Correspondence

Potential use of therapies for osteoporosis to treat neurological diseases of elderly people

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doi:10.1016/j.mehy.2005.11.008

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The application of extremely low frequency magnetic fields (ELFMF) exogenous to the brain has a series of beneficial effects. They stimulate the growth of neuronal extensions when applied to the chromaffin cells of newborn rats [1]. At human level, they improve blood circulation in the capillary vessels and areas of ischemia and increase local skin temperature by 3 °C [2]. Stemme [3] demonstrated that they increase the oxygen content in tissues by activating the hemoglobin molecule. Salkind verified that they compensate for the decrease in serotonin production in the elderly. When a magnetic field at a frequency of 5–8 Hz and strength of pT (picotelas) is applied to patients with Alzheimer's disease, there are improvements in the areas of graphic and visual memory, short-term memory, spatial orientation, mood and social relationships [4].

Alternatively, magnetic fields with a magnitude of mT, similar to the natural terrestrial field, have been used for the treatment of bone pathology, as they have capability for bone restoration and remodeling, improve hemodynamics and microcirculation and have analgesic and anti-inflammatory properties. They have been used to treat non-union fractures, osteonecrosis and osteoporosis in post-menopausal women.

In 2003, Dr. Zaldy Tan and associates reported that there was a strong correlation between bone mineral density (BMD) in the hip and the future development of neurological degenerative diseases of the brain [5]. They divided the patients into four groups according to their BMD. The group with the lowest BMD had the highest incidence of dementia later on. This concept opens a second pathway for the treatment of dementia, as it seems reasonable to accept that maintaining an acceptable level of BMD can be a good strategy for the prevention of dementia in the elderly.

Conclusions

- Applying ELFMF to the brain stimulates nerve tissue and creates a series of beneficial collateral effects for the treatment of neurological diseases.
- Applying magnetic fields similar to the natural terrestrial one can be used to increase BMD and possibly diminish the risk of future dementia. More studies will be needed to establish the most successful regimens.

References

[1] Feria-Velasco A, Castillo-Medina S, Verdugo-Diaz L, Castellanos E, Orozco Suarez S, Sanchez Gomez C, et al. Neuronal differentiation of chromaffin cells in vitro, induced by ELFMF. J Neurosci Res 1998;53(5):569–82.
[2] Warnke U. Grundlagen zu magnetisch induzierten physiologischen Effeckten. Therapiewoche 1980;30:4609–16.
[3] Stemme O. Physiologie der Magnetfeldbehandlung. München: Dr. Otto Stemme Verlag; 1992.
[4] Sandyck R. Alzheimer's disease: improvement of visual memory and visuoconstructive performance by treatment with picotesla range magnetic fields. Int J Neurosci 1994;76(3–4):185–225.
[5] Tan Zs, Seshadri S, Beiser A, Zhang Y, Feison D, Hannan MT, et al. Bone mineral density and the risk of Alzheimer's disease. Arch Neurol 2005;62(1):107–11.

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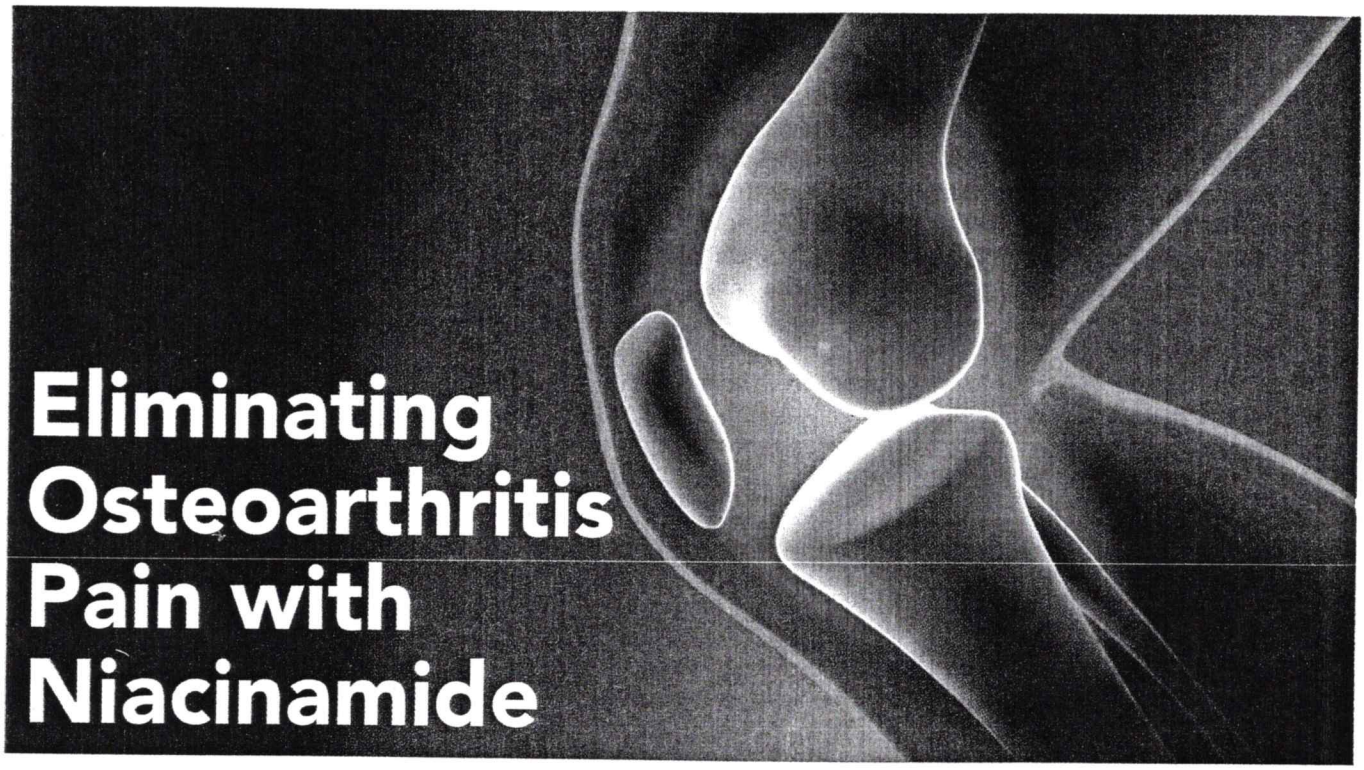


Eliminating Osteoarthritis Pain with Niacinamide

Image: Placidway, vimeo.com

The Research of William Kaufman, PhD, MD

by Jonathan V. Wright, MD © September 2016 – May 2017

Some time in the 1980s (I don't remember exactly when), a 74-year-old man (we'll call him Joe) came to Tahoma Clinic bringing copies of X-rays of his knees. He walked slowly with a cane, putting almost all of his weight on one knee. He said he'd been told that his only option was knee joint replacement surgery. We looked at his X-rays together. He said the orthopaedic surgeon he'd consulted remarked that they showed "bone on bone" on one side and "almost bone on bone" on the other. I couldn't argue with that.

Joe had refused to take any prescription painkillers or even aspirin—which the naturopathic doctor, whom his mother consulted "only when really necessary", had told him was an unnatural (and, of course, a patentable) derivative of white willow bark. White willow bark has been used for thousands of years to relieve pain. Even though Joe had taken increasingly large doses of white willow bark over the past few years, he did what the naturopath had told him: he always took it with food and never on an empty stomach, so he did not have any gastrointestinal irritation. But during the last year, even the large doses of white willow bark weren't "doing the job". Observing his pain, Joe's wife persuaded him to see the orthopaedic surgeon, who checked his knees, had the X-rays taken and told him that his only choice was knee replacement surgery. However, he'd never had any surgery—"not my tonsils or appendix or anything else"—and was at Tahoma Clinic as a last resort, just in case there was a more natural alternative. He had no other health problems, he said.

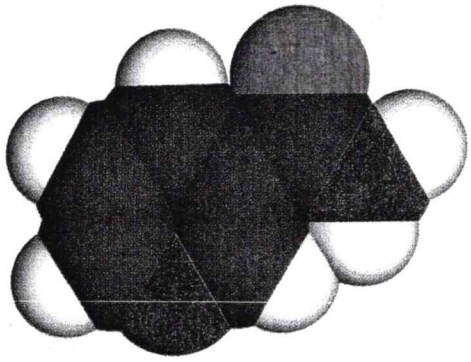
Joe's health history showed that except for the knees, he'd indeed had very few health problems. He credited his mother with that, telling me that because of "the way she'd lived and raised us" she'd had very few health problems in her entire life and was "still going strong at ninety-four". He continued to follow all of her health recommendations: "Eat right, exercise, get a good night's sleep, see only naturopathic doctors, and never ever take any drugs unless you'd die without them."

He told me that his younger brother had "taken a different path" after leaving home. He said that his brother ate Twinkies and doughnuts a lot, didn't eat very

many vegetables at all, and had become a chain smoker. He also drank alcohol regularly (but wasn't an alcoholic) and didn't exercise much. Joe's brother went to "regular doctors" who had him taking statins for high cholesterol and other patent medicines to lower his blood pressure. "But one thing he doesn't have is arthritis in his knees," Joe remarked.

After I finished compiling Joe's health history and doing a physical exam, I saw it was apparent that, other than the condition of his knees, Joe's health was indeed quite good, especially for age seventy-four. After hearing that, Joe looked disappointed and asked if that meant there was nothing else to do except to have surgery. So I told him about William Kaufman, PhD, MD [1910–2000], who in the 1940s thoroughly researched and proved a safe, effective remedy for osteoarthritis pain. This remedy also improved joint mobility significantly.

Dr Kaufman made his first observations concerning joint pain at a time when the large majority of Americans ate large quantities of processed, canned and refined foods, purely white flour and large quantities of sugar. Many people were so low in one or another essential nutrient that even a very small amount could make an observable difference within an hour or less.



A space-filling diagram of nicotinamide, also known as niacinamide ($C_6H_6N_2O$). (Image: SubDural12)

In 1943, Dr Kaufman published a book[1] describing the mental and physical effects of the deficiency of a single vitamin—niacinamide, one form of vitamin B_3—in 150 patients he had seen within the prior year. In my 1997 interview[2] with him, he described some of them:

"...any patient I gave niacinamide had to sit in my office for at least an hour, so I could observe what happened. My first observations were made in the days before bread and other white flour products were 'enriched'... So I really got a chance to observe the difference that niacinamide could make, starting from a position of real deficiency or semi-deficiency...

"There are many more details in my 1943 book, but let's cover a few. Within two-and-a-half to five minutes after taking the first 100 milligrams of niacinamide, there was a degree of physical and mental relaxation which became marked in the next 20 minutes. The first objective change, apparent within the first five minutes, is the relaxation of previously tense muscles, and the replacement of a drawn facial expression by a more calm one, or even a smile. Without suggestion, patients began to sit, walk and stand more erectly. Within the first five to 10 minutes, the color of the hands and feet might change from a sallow yellow to a healthy pinkish or ruddy color, and the hands and feet frequently are subjectively and objectively warmer. There are many more changes detailed in that book."

...Dr Kaufman observed that continuous use of niacinamide significantly reduced swelling in connective tissue and cartilage.

Chapter three of this book is titled "The Arthritis of Aniacinamidosis". In it, he describes improvements in arthritic pain and mobility experienced by these patients using relatively small doses of niacinamide. These observations inspired him to do a much larger and exacting study of niacinamide's effects on arthritis.

I quote Dr Kaufman again from the interview:

"...So in 1944, looking for objective data, I started precise measurement of the ranges of joint motion of every patient who had obvious arthritis, at the time of their first examination."

He designed exacting measurements of 20 joints or groups of joints that could be observed and recorded in five minutes on a specially designed form. Dr Kaufman's 1949 book[3] describes the results of this study of 455 patients with significant osteoarthritis. He explained that the changes in range-of-motion measurements were very necessary as they were objective measurements, and unlike changes in pain they could not be criticised as being placebo effects.

All 455 individuals had significantly less arthritis pain, and all had significant improvements in range of motion of their joints following treatment. Dr Kaufman explained that improvement started after three to four weeks of niacinamide use, and was maximised in three to four months. He also reported that taking higher quantities of niacinamide and taking them every few hours worked best. Although all arthritic joints could experience relief, the knees and shoulders responded best and most often, followed by the neck and then the wrists and fingers.

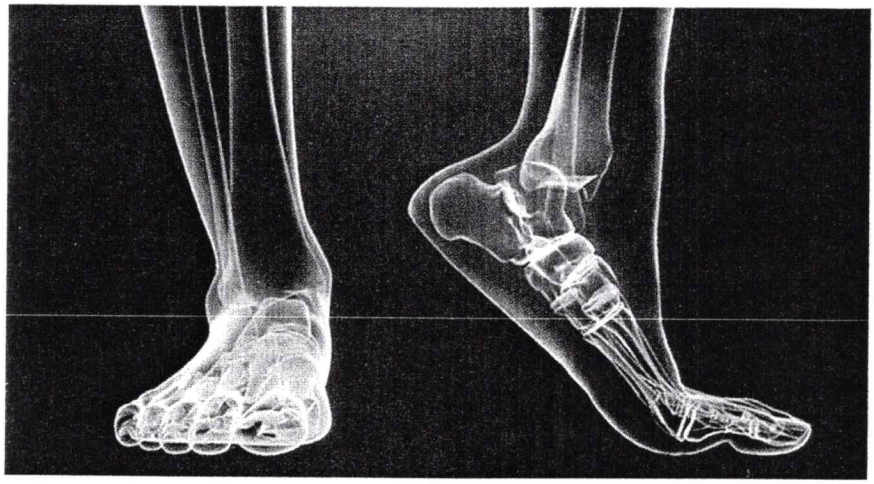
From repeated physical examinations, Dr Kaufman observed that continuous use of niacinamide significantly reduced swelling in connective tissue and cartilage. Laboratory testing of the "sedimentation rate" (a test still used frequently by physicians in 2016) demonstrated a significant reduction in inflammation. He'd also observed that it was more effective if the same total daily dose of

niacinamide was split into three or four smaller quantities. As he progressed with his research, Dr Kaufman gradually increased the overall daily amounts to be used and found that more niacinamide was more effective.

Of course, Joe heard from me only a summary version of the research findings above. But after hearing that niacinamide was most effective for the knees, he looked more optimistic and rapidly asked several questions: "Where do I get that niacinamide? Is it the same as niacin? How much do I take? Is it expensive? Can it hurt anything?"

Fortunately for us, if we take more niacinamide than our bodies want to process, our livers send us a signal: nausea! At first, it's usually just a low-grade nausea, like being on a boat and starting to be seasick. If we stop taking the niacinamide entirely until the nausea is gone—at most a few hours to 24 hours—and then resume taking it at a lower amount, we can cautiously find what the maximum dose is for us.

Niacinamide and niacin are very similar, so they're both called vitamin B_3, but their effects can be quite different. Niacin dilates blood vessels quite markedly for some of us, making us hot all over and sometimes itchy, too! Niacinamide never does this. Niacin can lower cholesterol, but too much for any one person can raise the blood sugar level without giving any symptoms. Niacinamide never does this, either. Niacinamide controls osteoarthritis pain, often completely. Niacin doesn't do this.



Osteoarthritic inflammation and pain can be relieved by supplementing with niacinamide (nicotinamide). (Image: Placidway, vimeo.com)

A usually effective quantity for both men and women is a total of three grams (3,000 milligrams) daily—perhaps one gram, three times daily. A few individuals have taken a total of four grams daily and reported better results. Niacinamide is available in doses of 500, 1,000 and, in a time-release form, 1,500 milligrams, which makes it easier for some—mostly men—to remember to take. But at the time when Joe first visited Tahoma Clinic, no time-release form was available so he chose to take one gram three times daily, which is rarely associated with nausea and is often enough to be quite effective.

Niacinamide in the "regular" (not time-release) form is available at all natural food stores and compounding pharmacies and at the Tahoma Clinic Dispensary. It's very inexpensive (Joe was really happy to hear that, as he said his funds were very limited). The time-release form available now costs more, but it still isn't at all expensive and for many it is more convenient.

Dr Kaufman's second book was published in 1949. And even though Dr Kaufman was a 1938 graduate of the University of Michigan Medical School, none of us who attended that medical school—I started in 1965, and escaped (sometimes called "graduated") with an MD degree in 1969—were informed about Dr Kaufman, his research or his books either in classes or in our work with patients. In the 1997 interview, I asked Dr Kaufman about this. Here's his answer:

"In my medical school years, we were drilled in great detail about vitamin-deficiency disorders during our lectures in internal medicine, pediatrics, public health, neurology, psychiatry and pathology. But after synthetic vitamins became available to treat florid deficiency diseases, *not* teaching about nutrition and vitamins became a national trend.

"I'm not surprised they didn't refer to my books. The reviews of my 1943 book were dismissive, because the 'experts' couldn't believe that the larger amounts of niacinamide I used in therapy improved joint mobility, muscle strength, maximal muscle-working capacity, and mental functioning."

Fortunately, Dr Kaufman's books "came my way" in 1976, three years after I'd started Tahoma Clinic.

By the time Joe came in, over a hundred people I'd seen with degrees of osteoarthritis varying from mild to severe proved to me what Dr Kaufman had already proven in the 1940s.

Back to Joe. He didn't return to Tahoma Clinic for over six months. He walked normally through the hallway to my office—no cane, no limp. He reported that he didn't feel much less joint pain until the third week after he'd started taking 1,000 milligrams of niacinamide, three times a day. In that third week, he noticed a little improvement. By the third month, the pain was nearly gone. From the fourth month until after the sixth, he had no pain. In the fifth month, he went back to the doctor who'd recommended surgery.

"He couldn't believe it," Joe said. "No cane, no pain; I was walking like normal! He insisted on taking more X-rays, and when he saw them he shook his head and told me this couldn't be happening—my 'bad knee' was still

'bone-on-bone'. He asked me what I'd done. I told him, and he just walked out of the room, shaking his head."

Joe had previously mentioned his brother's health, so I asked him again about him. Joe said the doctor had told his brother that he might be developing type 2 diabetes. "He's taking the same drugs as before," Joe said. "Apparently they haven't cured his basic problem. I keep telling him about diet and exercise and the right supplements being able to prevent type 2 diabetes and lower blood pressure and cholesterol all at the same time, because they all have the same cause—which isn't a lack of drugs! But all he does is keep telling me he doesn't have bad knees!"

Joe never returned to Tahoma Clinic. In the late 1990s, one of his children who was seeing me about bio-identical hormone treatment told me that he had died at age 87, "walking normally until the very end".

The large majority of those who use niacinamide for osteoarthritis, usually the "one gram, three times a day" amount although a few use more, achieve complete control of the pain after three to four months. A small minority has only partial relief. As documented so well by Dr Kaufman, everyone achieves a significantly greater range of motion by taking niacinamide. They usually avoid having joint replacement surgery.

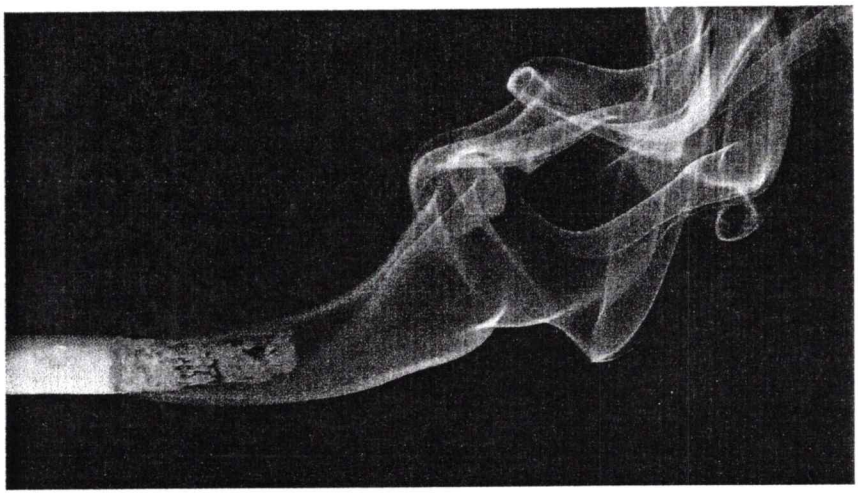
One thing I couldn't tell Joe was why his brother, with all of his other health problems, didn't also suffer from osteoarthritis. A number of research studies published in 2007[4], 2008[5], 2009[6], 2010[7] and 2012[8] all reported that osteoarthritis is a component of metabolic syndrome, the immediate precursor of type 2 diabetes.

Nicotine, Nicotinic Acid and Nicotinamide

So how did Joe's brother escape this fate? By smoking cigarettes containing tobacco! Not kidding! But how could tobacco actually be good for anything? A little background first. In the early 20th century, when the cause of pellagra was discovered to be a complete or nearly complete deficiency of vitamin B_3, the biochemical structure of the two different forms of vitamin B_3 was also being determined. The two were found to be so similar to nicotine (the addictive component of tobacco) that in the UK the two molecules were named "nicotinic acid" and "nicotinamide", and are still known as such today.

In the USA, the "regulators" decided that these names were unacceptable. The excuse was that many of us would think we could get our vitamin B_3 by smoking cigarettes! Apparently these "regulators" thought that Americans were not as smart as UK citizens who had all learned—and still know—the difference. So in the USA, nicotinic acid was renamed "niacin" and nicotinamide was renamed "niacinamide", and both molecules are still closely related to nicotine.

But how does this explain why Joe's brother didn't develop osteoarthritis? In 2011, researchers reported[9] that of 11,388 men, those who had smoked cigarettes for 48 years or longer were 42–51 per cent less likely to undergo total joint replacement (TJR) than men who had never smoked. In 2013, the same team of researchers reported[10] on total joint replacement in 54,288 elderly men and women. They wrote: "...Compared to non-smokers, male and female smokers were respectively



40% and 30% less likely to undergo a TJR." They concluded—as they did in their first research report—that further investigation should be done into how smoking tobacco cuts the risk of osteoarthritis and consequent joint replacement surgery.

I could be wrong, but the answer seems obvious: there's enough structural similarity between the nicotine and nicotinamide (the same as niacinamide) molecules to explain the effect of both in significantly reducing the need for joint replacement surgery.

But please don't start smoking if joint replacement surgery has been recommended for you! Lung cancer, emphysema, chronic obstructive pulmonary disease (COPD) or higher risk of heart attack, anyone?

Lastly: remember that osteoarthritis has now been identified as part of metabolic syndrome (which proceeds to type 2 diabetes). As this article is very long already, we'll save for another time reviews of the benefits of vitamin B_3 for individuals with type 2 diabetes. ∞

About the Author:

Jonathan V. Wright, MD, established Tahoma Clinic in 1973 in Washington State, USA, to offer nutritional and other natural therapies instead of patent medications for common health conditions. A long-time researcher, author, speaker and clinician, Dr Wright since 1983 has educated physicians in his techniques. Dubbed "The

Continued on page 81

The popular Dr. Oz suggests trying

Oatmeal. [illegible]
carbs to help you

How to Prevent Muscle Loss as You Age

As we age, we become more sedentary, which can contribute to muscle loss. This is a serious problem among seniors, as muscle atrophy can impair a person's ability to perform everyday tasks and increase the risk of falls and injuries.

We often hear that resistance training is the best way to maintain muscle, but unfortunately, many seniors prefer cardio exercises to weightlifting. Cardio is a great exercise for weight loss and cardiovascular and respiratory function, but it doesn't add much to muscle mass.

Many seniors fear weightlifting because they believe that they have to lift heavy weights to achieve results. But numerous studies suggest that even light weightlifting is enough to maintain and promote muscle. The key is to simply increase your repetitions with light weights to achieve results.

Even if lifting weights isn't your thing, there are other exercises that create resistance, such as yoga or Pilates, which promotes muscle growth.

Build Muscle Without Weights

Here are some other ways to promote muscle growth without lifting weights.

Eat Protein With Every Meal. Protein is essential for the formation of muscle. One study found that 62 percent of adults believed they were taking in adequate protein, but only 17 percent knew how much protein they actually needed to build and maintain muscle.

The recommended protein intake for adults is 0.36 grams of protein per pound of body weight. So if you weigh 150 pounds, you require 54 grams of protein per day. A very active person may require up to one gram of protein per pound of body weight.

A good way to ensure you are getting enough protein is by including it in all three meals. This means avoiding stocking up on protein during one meal. Research has shown that spreading out your protein intake is far more successful in protein synthesis than only including high amounts of protein in one meal. And protein doesn't just mean meat. You can enjoy eggs, cheese, dark leafy greens, and fish.

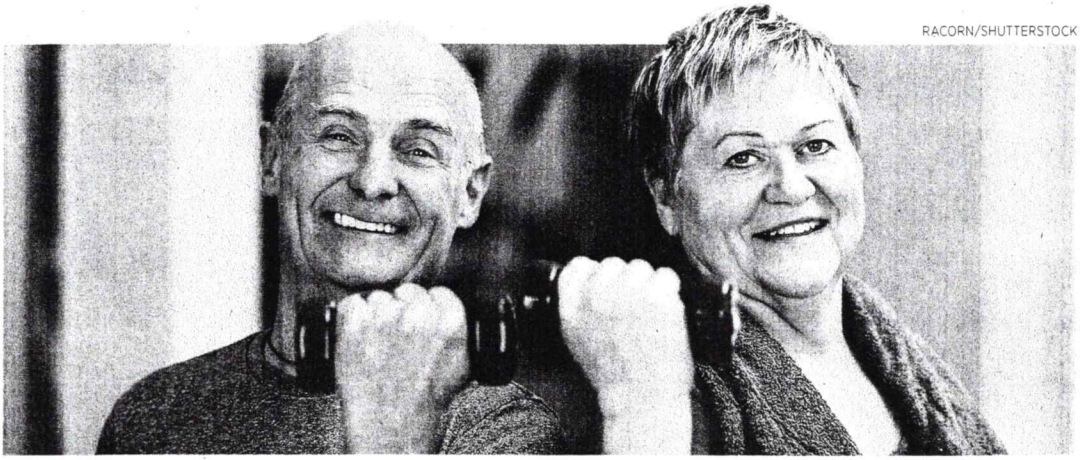
Always speak to your doctor about increasing your protein intake, as they can recommend safe and healthy ways to do so.

Eat Pomegranates. Research on animals has shown that consuming pomegranates reduces the risk of muscle loss. There are ongoing human studies to determine if these results are true for people as well. In the meantime, it's still a good idea to consume pomegranates, as they are high in antioxidants, which are good for overall health.

Get Natural Sunlight. Studies have shown that exposure to natural sunlight can help prevent muscle loss. For added benefit, try exercising outdoors so you get the power of a workout alongside the sun.

This article was originally published on BelMarraHealth.com

RACORN/SHUTTERSTOCK

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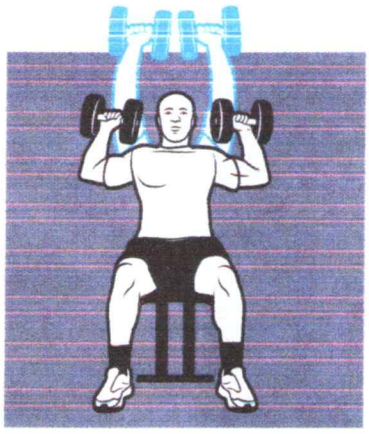
Wellness

Age-Proof Your Muscles

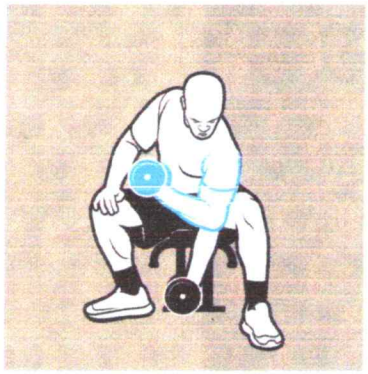
New research pinpoints the ideal moves to protect the male body as it ages

BY MANDY OAKLANDER

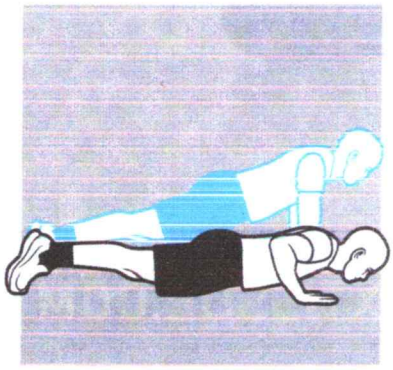
WOMEN HAVE BEEN TOLD FOR DECADES TO TAKE CARE OF THEIR BONES AS THEY AGE, BUT MEN HAVE new reason to follow suit. A study from the International Osteoporosis Foundation reveals that a third of all hip fractures occur in men—who are twice as likely as women to die afterward. Muscle mass, which helps strengthen and support bones, dwindles naturally as the body ages. The upside is that muscles can come back, says John P. Porcari, a professor of exercise and sports science at the University of Wisconsin at La Crosse. Porcari, who has studied fitness extensively, recommends these six simple moves.



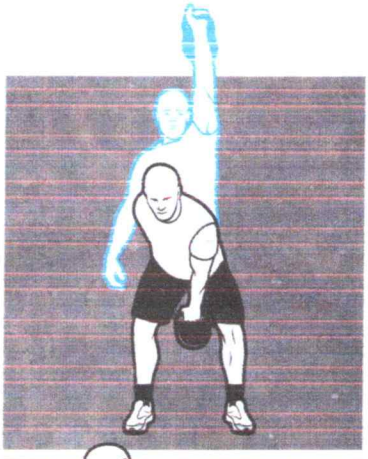
SHOULDERS
Fifty to 60 percent of men will get shoulder injuries in their lifetime, Porcari says. Prevent injuries by building strength. His group's recent study found that the dumbbell shoulder press was the No. 1 move for working the front part of the shoulders.



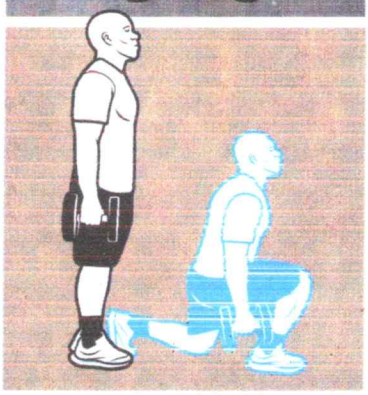
ARMS
Upper-body strength is often the first to go as we age, Porcari says. But a study he worked on this year, commissioned by the American Council on Exercise (ACE), found that concentration curls are best for building the biceps.



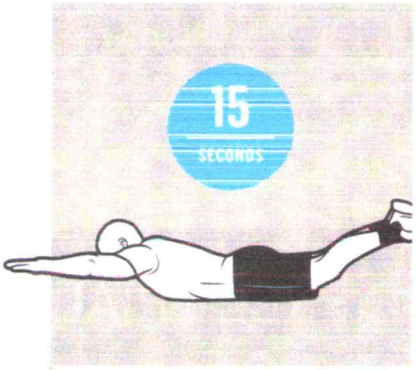
CHEST
Left alone, pectoral muscles will sink with age, but you can chisel them back with the humble push-up. "You'll get a better physique and better muscle mass," Porcari says. Start with wall push-ups, then move to knees, then to fully extended push-ups.



CORE AND ABS
A 2013 ACE-sponsored study found that kettlebell classes led to 70% more core strength than training without them. If you prefer to forgo equipment, an April study found that the traditional crunch activated more muscle than any ab device tested.

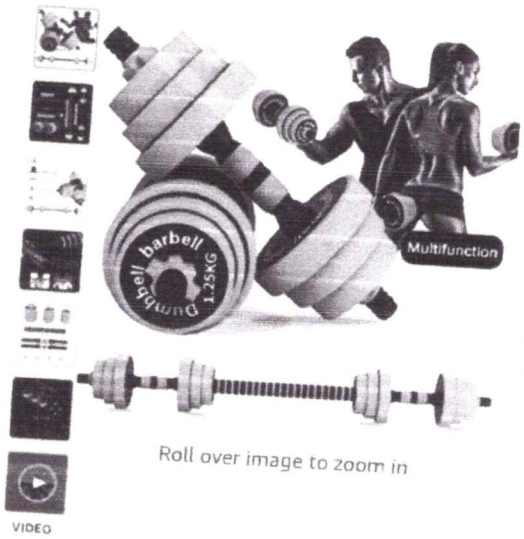


LOWER BODY
Build thigh and backside mass, which tends to sag as you age, with lunges (ideally done with a dumbbell in each hand). Lunges work the hamstrings and gluteus medius more than squats, a recent study found.



BACK
Men tend to be less flexible than women and carry more abdominal weight, which can strain the lower back. Support your spine with the 15-second superman.

‹ Back to results



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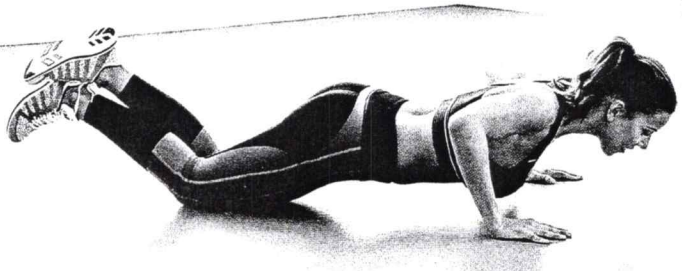
1 WIDE-ARM PUSH-UP

Works arms, shoulders, chest, abs

Start in a high plank with palms wider than shoulders, knees on floor, ankles crossed. Slowly lower chest to floor (as shown), then push back up to start for 1 rep. Do 2 sets of 10 reps.



2 BUNGEE CURL

Works arms, shoulders

Kneel on floor with a resistance band looped under knees, holding opposite end in hands at thigh level. Slowly lift hands until elbows are bent 90 degrees, keeping them close to body (as shown). Pause; lower slowly for 1 rep. Do 2 sets of 10 reps.

3 CHAIR DIP

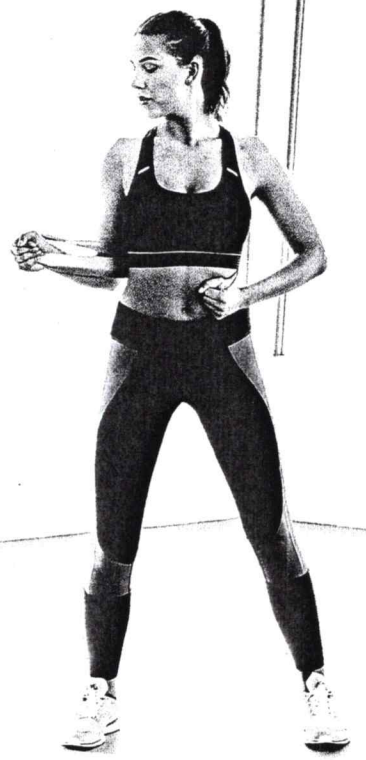
Works arms, shoulders, back

Sit on a sturdy chair, hands on edge of seat shoulder-width apart. Straighten arms to lift yourself off chair, legs extended (as shown). Lower to floor until elbows are bent 90 degrees. Push back up for 1 rep. Do 2 sets of 10 reps.

4 ARM ZINGER

Works arms, shoulders, back

Stand with a resistance band behind lower back, holding ends with palms at hips. Keep torso still and extend right arm out to side. Pause; slowly bend elbow (as shown) for 1 rep. Do 10 reps; repeat on opposite side. Do 2 sets.

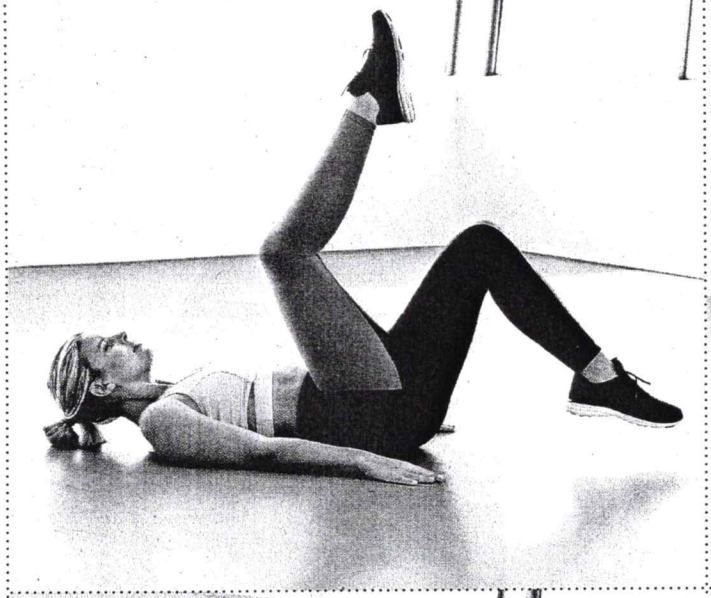


REMI PYADOL STYLING; COQUITO CASSIBBA; HAIR; HEATHER BLAINE; MAKEUP; CHELSEA SULE FOR MAKE UP FOR EVER; MANICURE; ISIS ANTELO AT ABTP.

1 STEP IT UP

Works abs, glutes, legs

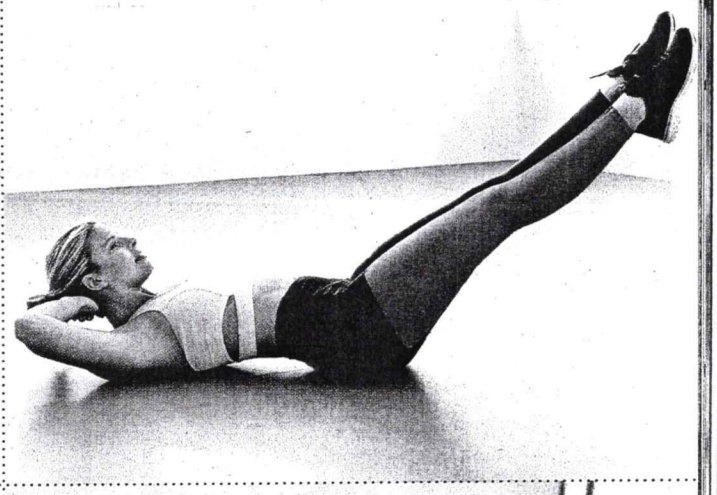
Lie faceup, arms and feet flat, knees bent 90 degrees, head a few inches off floor. Keep bend in knees as you bring right knee to chest (as shown). Pause; bring left knee to chest as you return right knee to start for 1 rep. Do 2 sets of 10 reps.



2 LEG LIFT

Works abs, glutes

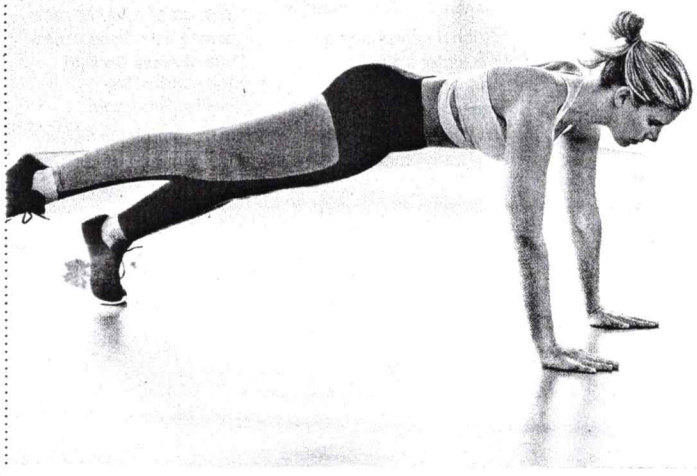
Lie faceup, hands behind head, toes pointed and legs lifted perpendicular to floor. Slowly lower legs (as shown) as close to floor as possible without touching for 1 rep. Do 2 sets of 10 reps.



3 TAP IT OUT

Works abs, shoulders, glutes

Start in a high plank with hands shoulder-width apart. Keep hips as still as possible as you lift right foot 12 inches and point toe (as shown). Tap toe to floor about 12 inches to right. Return to start for 1 rep. Do 10 reps; repeat on opposite side. Do 2 sets.

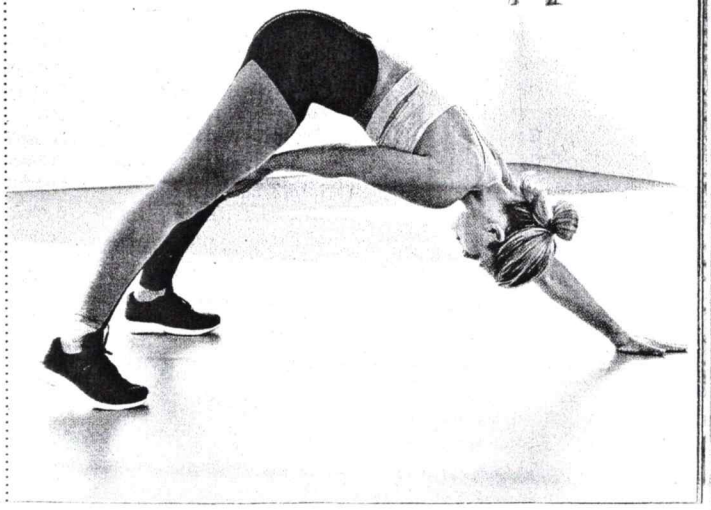


4 DOWNWARD DOG REACH

Works abs, arms, legs

Start in a high plank with feet wider than hip-width apart. Keep feet still as you shift hips up and back. Reach right hand under and across to tap left knee (as shown). Return to high plank and repeat on opposite side for 1 rep. Do 2 sets of 10 reps.

READY FOR LEGS AND BUTT? Get the next two series of moves and find out exactly how to mix and match all four routines at **Self.com/go/6weekstosummer.**



Tape Here

Thank You

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