To Your Health
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Bone Up on Bone Health

By Dr. Richard Drucker

Bone disease has reached near-epidemic proportions in America. Millions of people are suffering the often-crippling and devastating effects of diseases such as osteoporosis, a condition that results in a "demineralization" of the bone matrix, causing bones to become less dense over time and increasing the risk of fractures, especially of the spine, wrist and hip; and osteopenia (softening of the bones). Osteoporosis is the most common bone disease. According to the National Osteoporosis Foundation, an estimated 10 million Americans over the age of 50 have osteoporosis, while another 34 million have osteopenia. Unfortunately, the problem continues despite enormous consumption of calcium supplements and easy availability of vitamin D (from sunlight) - both of which are known to positively affect bone.

Let's discuss why good bone health is so important, as well as the consequences of poor bone health and the pros and cons for supplementing with bone-support nutrients. First, it is important to realize that a healthy skeletal system consisting of mineral-dense, strong bones is essential to overall health and quality of life, since bones help support the body, provide attachments for skeletal muscles, and protect vital organs such as the brain, heart and lungs. Bones are also a storehouse for life-supporting minerals including potassium, calcium and magnesium. When needed, these minerals are released from our bones into the bloodstream and delivered to cells.

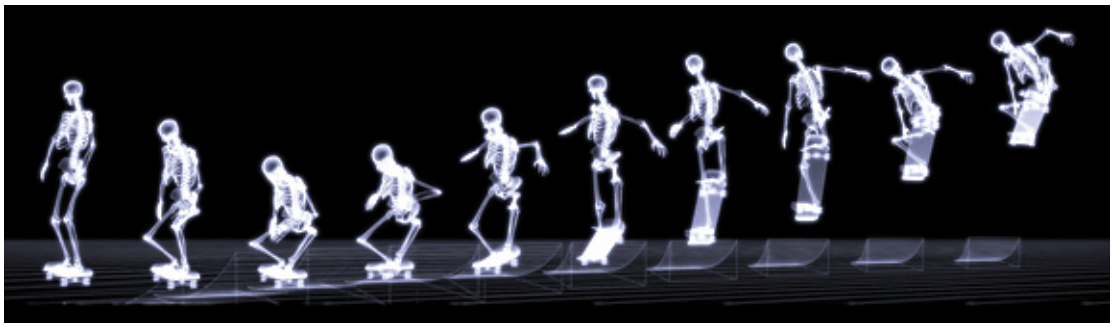
The Consequences of Poor Bone Health

The importance of *good* bone health can best be demonstrated by realizing the consequences of *poor* bone health. Over time, bone disease can lead to a steady decrease in the ability to perform everyday normal functions such as walking, standing, or dressing. Bone disease can also lead to hip fractures, which - depending on your age and overall health - can be debilitating and even deadly.

Each year, an estimated 1.5 million people suffer an osteoporosis-related fracture, which can have a dramatic impact on their health. For example, 20 percent of senior citizens *die* within one year of suffering a hip fracture and another 20 percent are confined to a nursing home. A long-standing misconception is that these situations apply only to older women. Keep in mind that bone disease affects men and women of all ages and ethnicities, and is growing in severity and frequency. At the current rate, one of every two Americans over the age of 50 will be at risk for fractures from low bone mass by the year 2020, according to a 2004 report from former U.S. Surgeon General Dr. Richard H. Carmona.

Osteoporotic hip breaks make up the majority of fractures and account for more than 300,000 hospitalizations each year. Amazingly, the direct care costs for these fractures alone add up to more than $18 billion each year. The total cost of a hip fracture for one individual can be more than $81,000 during their lifetime.

There are two important points that should be stressed regarding hip fractures. Contrary to popular belief, falling down generally does not cause the specific break. When standing, walking or running, there is normally a significant amount of what is known as *axial compressive force* on the strong neck of the femur near the hip joint. Due to a weakening of the femur neck from osteoporosis or similar bone-weakening conditions, it will tend to break first, resulting in a fall - not the other way around.



Additionally, falling down is not necessarily a natural part of the aging process. Just look at children, who generally fall down much more frequently than adults, yet are able to withstand those falls and/or recover much more quickly. It is the strength of the bones that determines the extent of damage (or lack thereof) when a fall does occur. Most falls can be prevented, yet they typically are more dangerous in the elderly population. For this reason, an important aspect of preventing bone fractures is to improve home safety and reduce accidents, in addition to improving bone density and strength.

How to Maximize Bone Health

The good news is that it is never too late to improve bone health. With daily exercise, good nutrition and other easy strategies, people of all ages can strengthen and maintain strong bones, resulting in longer, healthier lives. As early as childhood, you can plant the seeds of good bone health and continue to do so throughout life. Here are a few recommendations on how to keep your bones strong for a lifetime.

Exercise Regularly; Especially the Weight-Bearing Variety

The first and most important way to build strong, healthy bones is to participate in weight-bearing exercise on a regular basis. In the past few decades, mounting evidence suggests that most people do not participate in enough physical exercise to support strong skeletal growth. A research review published in *Sports Health* emphasizes that weight-bearing exercises, especially those that include higher levels of strain such as running or jumping, can be effective in enhancing bone health and preventing future diseases and injury.

"There are many facets related to maintaining bone health, including genetic, intrinsic and environmental factors, but physical activity is by far one of the strongest means to develop and maintain healthy bone mass," explains Ron Zernicke, PhD, DSc, director of the Bone and Joint Injury Prevention and Rehabilitation Center at the University of Michigan, as quoted in Dr. Carmona's 2004 *Report on Bone Health and Osteoporosis*. "Because a high number of older women experience osteoporosis, postmenopausal women may receive the most benefits from improving bone mineral density (BMD) through weight-bearing exercise. Regardless of age, weight-bearing exercises are extremely beneficial."

While most exercises will help increase bone density, some are more beneficial than others. For instance, exercises that put a larger strain on the body (gymnastics, dance and power sports such as weight-lifting), exercises that involve a higher strain rate (e.g., jumping activities), and those that have a higher strain frequency (e.g., running) appear to increase bone density in particularly effective fashion. Research also notes that the benefits of exercise on bone health can be achieved with less time-consuming programs such as 12 minutes per session, three days a week. In the end, weight-bearing exercise, even when performed for 15-20 minutes per day, can strengthen the skeleton significantly.

Physical skeletal resistance is essential for elevated bone mass. While calcium is known for its positive effects on bone (see nutrition section below), it's important to recognize that regardless of the amount of calcium ingested, unless there is a physical need for the bones to get stronger from a stress demand, supplementation is almost useless.

The amount of calcium circulating in the blood is controlled by the parathyroid glands, small glands in the neck. Circulating blood calcium is removed and delivered to skeletal bones based on need (i.e., physical stress), causing the bone to adapt under mechanical force. The specific mechanism that increases bone density is known as the *piezoelectric effect*. In technical terms, bone-building cells called osteoblasts are attracted by electrical dipoles produced by the piezoelectric effect from stress on the bone or outside electrical stimuli, which, in turn, deposits minerals (primarily calcium) on the stressed side of the bone. Therefore, exercise stimulates bone cells to use calcium and increase the density of the stressed bone.

While bone density can improve at any stage of life, the most critical time is during the pre- and early-puberty periods. Regular exercise for children is the key to developing healthy bone structure and promoting long-term injury prevention. Younger children and teens need at least an hour of physical activity every day that includes strengthening exercises. Adults should get at least 30 minutes of moderate physical activity every day. Simple activities like walking and stair climbing will strengthen bones, but any form of resistance exercise, such as weight-lifting, is ideal. In addition, exercise benefits the elderly by improving balance and coordination, thus resulting in fewer falls, which as we discussed previously, is extremely important to their health and function.

Eat Right and Take Bone-Building Supplements

Another aspect of developing healthy bones is eating healthy foods and avoiding unhealthy ones. Due to the mass consumption of processed, overcooked and nutrient-depleted foods, most people absorb and utilize too little calcium and vitamin D for good bone health - even if they're eating foods that are high in both. However, eating a diet that consists primarily of fresh organic fruits and vegetables will do the trick, since most contain healthy levels of calcium, vitamin D and many other beneficial vitamins and minerals that are readily absorbed by the body.

That said, for most individuals, dedicating oneself to getting enough calcium and vitamin D through an organic diet can be challenging, so supplementation becomes necessary. The best supplements incorporate organically complexed (carbon-bond) nutrients from live, whole-plant foods of the highest quality that avoid the use of synthetic chemical ingredients, preservatives, binders, coatings, and other non-natural substances as much as possible. Also remember that it's important to get adequate amounts of calcium and vitamin D, since the latter improves absorption of the former.

What about dairy products? Contrary to popular belief and advertising, dairy products, including cow's milk, while containing high levels of calcium, are in a form that is *not* compatible with human digestion, assimilation and absorption. Typically, they also are high in saturated fat, can have high levels of pesticides, antibiotics and hormones, and if pasteurized, contain deactivated enzymes caused by high heat. Dairy products contain lactose, which many people have difficulty absorbing due to the lack of the digestive enzyme lactase. Many infants and small children, as well as some adults, have allergies to dairy products, especially milk. That means we need to find other sources of bone-building nutrients in our food or make sure we are taking the appropriate supplements to held build healthy, strong bones.

The Power of Good Living

As a final recommendation, it's important to appreciate that bone-weakening can be averted and calcium absorption enhanced by abstaining from smoking, limiting alcohol intake, and decreasing or eliminating consumption of caffeine and soft drinks. Of course, these are all things we should be limiting and/or eliminating from our lives for various health reasons, not just in terms of bone health.

Do You Know How Strong Your Bones Are?

Women over 65 years of age and those who have suffered low-trauma fractures after age 50, as well as those with significant risk factors for low bone density, should be screened periodically to assess their bone health. Bone-density tests are safe, painless and quick, and are a good indictor of bone health.

As little as 30 years ago, doctors believed weak bones and osteoporosis were a natural part of aging, but that view has changed. Much can be done to prevent bone disease. You should be aware of early indicators of bone disease and talk to your doctor about whether you have any potential risk factors for bone disease. Of course, you should also talk with your doctor about these and other recommendations to promote bone health.

One of the most important signals that patients might have poor bone health is a previous fracture (particularly one that seemed to occur in the absence of major trauma) or a family history of bone disease. Additionally, if you have a poor diet, don't exercise regularly and pursue other lifestyle behaviors that could negatively affect bone health.

As well, certain medication are noted for causing bone loss, such as corticosteroids, glucocoricoids, chemotherapy, hormone-replacement medications and antiepileptic drugs; and hormone excesses or deficiencies, e.g., parathyroid hormone, estrogen, thyroxine, as well as vitamin and mineral deficiencies, can negatively affect bone. Diseases that may lead to or aggravate osteoporosis include hyperthyroidism, hyperparathyroidism, cancer, arthritic conditions, genetic abnormalities such as osteogenesis imperfecta, rickets, osteomalacia, kidney disease, and endocrine disorders.

If you fall into any of the above risk groups, it's even more important to get screened periodically and talk to your doctor about ways to minimize your risk of developing bone disease. Many bone diseases such as osteoporosis and osteopenia are preventable and treatable. Since there are no obvious warning signs for many bone ailments, it is important to be aware of the risks and be proactive in being responsible for one's

own health primarily through diet, supplementation and resistance exercise. Talk to your doctor for more information.

Two Is Better Than One: Calcium and Vitamin D for Bone Health

Calcium and vitamin D are often supplemented together (for example, vitamin D is added to milk) because the latter improves the body's ability to absorb the former. And of course, both nutrients are important for building and maintaining bone density.

Here's how much you should get of each on a daily basis, based on age:

Children & Adolescents	***Calcium (Daily)***	***Vitamin D (Daily)***
1-3 years	500 mg	400 IU
4-8 years	800 mg	400 IU
9 -8 years	1,300 mg	400 IU
Adult Women & Men		
19-49 years	1,000 mg	400-800 IU
50 years and older	1,200 mg	800-1,000 IU
Pregnant & Breast-Feeding Women		
18 years and younger	1,300 mg	400-800 IU
19 years and older	1,000 mg	400-800 IU

Source: National Osteoporosis Foundation (www.nof.org). According to the NOF, calcium and vitamin D recommendations for children (above) are provided courtesy of the American Academy of Pediatrics.

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