Editorial

How to Maintain Bone Health with Age

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Human bone is calcified tissue composed of organic (30%), inorganic (60%) and water (10%). The primary organic material component is collagen a protein that provides flexibility and tensile strength. Then, the main inorganic component is hydroxyapatite, a mineral form of calcium phosphate, which gives bones their hardness and compressive strength. Other important composition of bone formation are bone marrow and different types of cells, like osteoblasts (bone forming cells), osteocytes (mature bone cells), Osteoclast (bone resorbing cells) and bone lining cells. Analysis of DNA often persists in Bones and Teeth. Bone doesn't contain DNA. They only have the breeding enzymes them.

Key Points

- Vitamin D is important for good bone health because it aids in the absorption and utilization of calcium. There is a high prevalence of vitamin D insufficiency in nursing home residents, hospitalized patients, and adults with hip fractures.
- Calcium has been singled out as a major public health concern today because it is critically important to bone health.
- Genetic factors play a significant role in determining bone mass, controllable lifestyle factors such as diet and physical activity can mean the difference between a frail and strong skeleton.
- Physical activity is important for bone health throughout life. It helps to increase or preserve bone mass and to reduce the risk of falling. All types of physical activity can contribute to bone health.
- Maintaining a healthy body weight is important for bone health throughout life. Being underweight raises the risk of fracture and bone loss. Weight loss is associated with bone loss as well, although adequate diet and physical activity may reduce this loss.
- Reproductive issues can affect bone health. Pregnancy and lactation generally do not harm the skeleton of healthy adult women. Amenorrhea (cessation of menstrual periods) after the onset of puberty and before menopause is a very serious threat to bone health.
- Several medical conditions and prescription medications can affect bone health through various mechanisms, and health care professionals should treat the presence of such conditions and the use of such medications as a potential red flag that signals the need for further assessment of bone health and other risk factors for bone disease.
- Fractures are commonly caused by falls, and thus fall prevention offers another opportunity to protect bones, particularly in those over age 60.
- Smoking can reduce bone mass and increase fracture risk and should be avoided for a variety of health reasons. Heavy alcohol use has been associated with reduced bone mass and increased fracture risk.

A variety of studies indicate that genetic factors are responsible for determining 50–90 percent of bone mass and other qualitative aspects of bone (Recker and Deng 2002)[1]. Heredity not only sets limits on how much bone a person acquires, but also on bone structure, the rate of bone loss, and the skeleton's response to environmental stimuli like nutrients and physical activity. Normal bone mass and strength is controlled by many genetic elements working in concert. The tendency to develop bone diseases like osteoporosis and Paget's disease also appears to be due to genetic factors, although this tendency may also be influenced by environmental factors that are not yet completely understood.

About Nutrition and Bone Health

- Research suggests that a well-balanced diet is important for bone health throughout life. Depending on age, it may help increase or preserve bone mass.
- Much of the research to date has focused on calcium and vitamin D. Calcium and vitamin D play crucial roles in bone health, although other nutrients are also important.
- The recommendation of calcium intake as children age, beginning with 210 mg per day in infants and rising to 1,300 mg per day in those age 9–18. Recommended levels drop to 1,000 mg per day in those age 19–50, and then increase to 1,200 mg per day for those over age 50. The same age-dependent recommendations for calcium apply to pregnant or nursing women. Recommended levels of vitamin D intake are 200 IU per day for those under age 50, 400 IU per day for those 50–70, and 600 IU per day for those over age 70.

About Vitamin D and Calcium

The goal of this effort was to determine the level of nutrient intake for normal, healthy individuals that would prevent the development of a chronic condition associated with that nutrient. Some individuals lactose intolerance may play a role in not consuming adequate levels of calcium. Lactose intolerance is a condition in which individuals cannot metabolize lactose, the main sugar found in milk and other calcium-rich dairy products. An estimated 30–50 million Americans

(about 25 percent of the U.S. population) are affected by lactose intolerance, although to varying degrees. While least common among Whites (it affects about 15 percent of White adults), lactose intolerance is widespread among other ethnic groups. Among the adult population, an estimated 70 percent of African-Americans, 74 percent of Native Americans, 53 percent of Mexican-Americans, and 90 percent of Asian-Americans are affected (Jackson and Savaiano 2001)[2].

Vitamin D is important for good bone health because it aids in the absorption and utilization of calcium. The main source of vitamin D is sunlight, and most people throughout the world get their supply of vitamin D by the conversion of precursors in the skin to active vitamin D, a process caused by exposure to sunlight.

Calcium eaten in the diet must first be absorbed into the body. In fact, much of the calcium consumed in the diet does not make its way to the skeleton; studies indicate that in adults only about 30 percent of calcium intake is actually absorbed by the body. Moreover, some calcium is excreted from the body into the intestine so that the actual net absorption is even lower (Heaney and Abrams 2004)[3].

Several factors can affect the body's ability to absorb dietary calcium, including vitamin D and estrogen. Deficiencies in either can reduce calcium absorption. The problem of reduced calcium absorption is more acute in older persons, who absorb less dietary calcium because their intestines are no longer as responsive to the action of 1,25-dihydroxy vitamin D. Poor absorption of calcium can be overcome by increasing overall calcium intake and maintaining adequate levels of vitamin D.

Effect of Calcium and Vitamin D on Bone

Individuals who consume adequate amounts of calcium and vitamin D throughout life should enjoy better overall bone health for two reasons. First, they are more likely to achieve optimal skeletal mass early in life, and second, they are less likely to lose bone later in life. The net result should be higher bone mass and fewer fractures. Selected evidence to support the relationship between these nutrients and bone health during different stages of life.

On Children and Adolescents

The role of calcium and other minerals in achieving peak bone mass begins before birth. Premature infants tend to have lower bone mineral content later in life, although this may in part be due to their tendency to be light and short for their age. Low birth weight is also associated with low bone mass later in life (Antoniades et al. 2003)[4].

Many observational studies make it clear that the role of calcium in achieving optimal peak bone mass continues into childhood and adolescence (Heaney et al. 2000)[5].

Several randomized clinical trials have examined the effect of calcium supplements or calcium-rich foods in children and adolescents (Merrilees et al. 2000)[6]. These studies have been combined and summarized in a meta-analysis (Wosje and Specker 2000)[7], which concluded that higher calcium intake increases bone mineral density (BMD) in children and adolescents in certain circumstances. Increases in BMD were more likely in cortical bone sites and among populations with low baseline calcium intakes, and in most studies the increase did not persist beyond the calcium supplementation period. Adequate levels of calcium intake may also be important in maximizing the positive effect of physical activity on bone during the growth period.

On Adults

Eating adequate amounts of nutrients continues to be important during the young adult years when bone formation and bone resorption are balanced. Unfortunately, most studies of diet and supplement use and bone health have focused on either younger or older individuals. In a study did find that even young men may experience low vitamin D levels in the winter, and that these low levels were associated with lower BMD (Valimaki et al. 2004)[8]. More information is needed about the role of calcium, vitamin D, and other nutrients in maintaining bone in this age group of women and in men.

On Older Adults

Most randomized clinical trials examining the effect of calcium and vitamin D on bone health have focused on postmenopausal women and the elderly, so the role of these nutrients in promoting bone health is more clearly established for this age group.

Elderly individuals who are vitamin D deficient face an increased risk of falls (Flicker et al. 2004), studies have shown that vitamin D supplementation in these individuals may negate this effect (Dukas et al. 2004)[9]. It is important to note that the design of many of the randomized, controlled trials examining the effect of vitamin D supplements on bone loss or fracture incidence also called for participants to use a calcium supplement.

Other Nutrients for Bone Health

Other nutrients/dietary components that appear to play a positive role in bone health include vitamin K, vitamin C, copper, manganese, zinc, and iron. These micronutrients are essential to the function of enzymes and local regulators and therefore are important to forming the optimal bone matrix.

Potassium also appears to play an important role in bone health. Diets abundant in potassium-rich fruits and vegetables may reduce the need for calcium to be mobilized from the skeleton. Epidemiologic and short-term intervention studies suggest higher intakes of alkaline potassium salts reduce urine calcium excretion and markers of bone resorption and have been associated with increased bone density (New et al. 2004) [10].

Many nutrients in addition to calcium and vitamin D play a role in bone health, it is important to consume a

well-balanced diet containing a variety of food, rather than just focusing on one or two bone-related nutrients. This approach can have positive effects on other aspects of health as well. For example, the DASH diet (Dietary Approach to Stop Hypertension), which encourages fruit and vegetable intake in addition to more calcium and less sodium intake, has been linked to lower bone turnover and better cardiovascular status (Lin et al. 2003)[11]. In a recent study of young girls a high intake of fruits and vegetables was associated with increased bone mineral content (Tylavsky et al. 2004)[12]. Fruit and vegetables also provide vitamins, minerals, and fiber, and should be encouraged for overall good nutrition. As alluded to above, abundant potassium intake via increased fruit and vegetable intake may be particularly beneficial for skeletal health. Specific suggestions for selecting a well-balanced diet.

Advise for Bone Health

Support your frame

One of the best ways to shore up your skeleton is to choose a diet that includes plenty of calcium and vitamin D, two nutrients essential to strengthening bone tissue. The other crucial move: engaging in weight-bearing exercise – like walking, running, or strength training – a few times a week. These workouts exert a force on your bones that stimulates them to produce new cells. It's also important to get a bone-density test at some point, to check for weaknesses.

Support with Physiotherapy

If musculoskeletal pain crops up somewhere in your body and you end up in a doctor's office, you may be given a choice between drugs (such as painkillers or steroids), surgery, and physical therapy. Many orthopedists recommend trying the latter first: PT helps strengthen the area that's causing your discomfort and corrects any imbalances that may be contributing to the problem. The therapy may even build up your resilience. It could reeducate your central nervous system to be less sensitive to pain signals.

Body Posture

Many of us are spending even more time sitting at home. That could explain a lot about how your body feels. Sitting in one position or with poor posture tightens up many of your muscles, ligaments, and joints, which often leads to soreness and pain.

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