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# A BARE-BONES LOOK AT BONE HEALTH

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Contrary to what you might think, there is more to supporting healthy bones than drinking milk. While calcium is an essential nutrient for your bones, it is by no means the only nutrient they need. There are many other vitamins, minerals and lifestyle factors involved in building and maintaining strong bones. In this article, we'll review some of the more important ones.

**Y**our bones are made up of living tissues that are continually breaking down and building up. This process, called remodeling, occurs throughout your lifetime. When you are young, bone buildup outpaces bone breakdown until you reach peak bone mass between 25–35 years of age, depending on your genes and gender. Once you reach peak bone mass, bone breakdown begins to surpass bone buildup. That is why it is essential to develop healthy eating and exercise habits during childhood and adolescence. Research suggests you can reduce your risk of bone disease by achieving a higher peak bone mass. ➤

Your bones and teeth contain 99 percent of the calcium that circulates in your body, which is why you hear so much about the importance of calcium for healthy bones. Calcium combines with phosphorous in a process called mineralization, which provides structure and strength to your bones. Having too little calcium can result in poor bone mineralization, which weakens bones and can lead to bone diseases such as rickets or osteoporosis. Therefore, it is important to get the recommended amount of calcium in your diet. Dairy foods are considered one of the best sources of calcium to support healthy bones; however, there are other foods that are good sources of calcium, including several green vegetables, almonds, sesame seeds and tofu, to name a few. The added benefit of eating these foods is they contain many other nutrients that support your health.

Bone tissue is either compact (hard, dense) or spongy (softer, less dense), but both types contain the same components: mineralized calcium and collagen. Collagen is a fibrous protein that helps form the connective tissue in bone. Both zinc and vitamin C are important for the formation of collagen. Zinc also plays a role in bone mineralization, and researchers have linked low levels of zinc to osteoporosis in humans. So, it is important to incorporate foods rich in vitamin C and zinc into your diet. Fruits and vegetables are good sources of vitamin C, especially green vegetables and oranges, strawberries and papaya. Sources of zinc include meats, eggs and beans.

Vitamin D is another nutrient you need for healthy bones because it helps your body absorb calcium. You can get vitamin D when your skin is exposed to sunlight, or by drinking fortified milk or taking a vitamin D supplement.

Magnesium is an important mineral for maintaining bone structure and function. Two-thirds of the magnesium in your body can be found in your bones. Magnesium deficiency is rare since the mineral is available in many foods; however, older individuals may be

### Exercises That Help Increase BONE *Density*

	Weight-bearing exercises	running jogging walking hiking dancing tennis soccer
	Resistance or strength-training exercises	weight-lifting, exercises with resistance bands, water aerobics

at risk for mild deficiency of this mineral due to certain medications or simply as a result of aging.

Low levels of vitamin K have been associated with low bone-mineral density and increased incidence of fractures. Your body needs vitamin K to produce osteocalcin, a protein found in bones, which is important for bone mineralization. Vitamin K is made by your body through bacteria in your intestine. Prolonged use of antibiotics can wipe out these helpful bacteria, so maintaining a healthy balance of intestinal flora is one way you can support your vitamin K status. But you also can get vitamin K from your diet. Many green vegetables are especially rich in vitamin K.

Dietary protein is essential for healthy bone metabolism. It supports bone formation during childhood and adolescence and helps to

### Risk Factors for BONE *Disease*

<ul style="list-style-type: none"><li>+ <b>Age.</b> Your risk of bone disease increases as you age.</li><li>+ <b>Race.</b> Women who are Caucasian or Asian are more likely to develop bone disease.</li><li>+ <b>Bone structure and body weight.</b> Small-boned and thin women are at greater risk.</li><li>+ <b>Lifestyle.</b> Smoking, excessive alcohol intake and little or no weight-bearing exercise increase the risk, as does a diet with inadequate calcium.</li></ul>	<ul style="list-style-type: none"><li>+ <b>Family and personal history</b> of fractures as an adult.</li><li>+ <b>Medications/chronic diseases.</b> Certain medications used to treat rheumatoid arthritis, endocrine disorders, seizure disorders and gastrointestinal diseases may have side effects that can damage bone.</li><li>+ <b>Menopause.</b> Postmenopausal women have an increased risk of developing bone disease.</li><li>+ <b>Gender.</b> Females are at greater risk of developing bone disease.</li></ul>
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Adapted from the National Osteoporosis Foundation (2007)

maintain bone mass during adulthood. However, you should eat the recommended levels of dietary protein, as too little can interfere with calcium absorption in the intestine and too much can lead to excess calcium loss. Moderate levels of protein intake are optimal, as described in the USDA recommended intake levels (see [www.mypyramid.gov](http://www.mypyramid.gov)).

Lifestyle factors also play a critical role in the health of your bones. Exercising, avoiding tobacco products and limiting the amount of alcohol you consume can help you maintain healthy bones. Your bones, like your muscles, will strengthen with exercise. Bones need specific types of exercise – weight-bearing exercise and resistance (or strength) training – to maintain and build density. Weight-bearing exercises are exercises that require your bones to support your body's weight. For example, when you jog or walk, your legs are bearing the weight of your body. Resistance or strength training involves using weight or resistance to build strength. Research has shown that strength training increases bone density and reduces the risk for fractures, particularly for postmenopausal women, who have a high risk for bone disease.







Smoking and alcohol may be linked to increased loss of bone. Researchers have linked smoking to an increase in fractures and hypothesize that for some women, smoking may interact with estrogen in a way that could reduce intestinal calcium absorption. While moderate alcohol consumption has not been linked to osteoporosis, studies have shown that consuming more than two alcoholic drinks a day may decrease bone formation and reduce your body's ability to absorb calcium.

The way you eat and the amount and type of exercise you get during your lifetime can greatly impact the health of your bones. Not getting enough calcium or other essential nutrients, smoking, and not getting enough exercise can lead to a weakening of your bones and put you at risk for bone diseases. The good news is that you can prevent bone disease with a healthy diet and lifestyle.

To learn more about bone health and bone disease prevention, talk to your doctor and visit the Centers for Disease Control and Prevention's Web site at [www.cdc.gov/nccdphp/dnpa/nutrition/nutrition\\_for\\_everyone/bonehealth/index.htm](http://www.cdc.gov/nccdphp/dnpa/nutrition/nutrition_for_everyone/bonehealth/index.htm) and the National Osteoporosis Foundation at [www.nof.org](http://www.nof.org). ■

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## Whole-Food Sources of Nutrients That Support *BONE Health*

	Calcium	dairy products (such as cow's milk and yogurt) broccoli cooked kale collard greens spinach almonds sesame seeds tofu
	Magnesium	whole grains broccoli squash nuts dairy products chocolate
	Vitamin C	broccoli bell peppers kale cauliflower strawberries Brussels sprouts papaya cabbage spinach kiwifruit oranges grapefruit tomatoes
	Vitamin D	sun exposure fortified milk* fortified orange juice* supplements
	Vitamin K	broccoli cabbage spinach Brussels sprouts turnip greens
	Zinc	red meat poultry fish eggs legumes whole-grain bread milk

\* These sources are not whole-food sources with naturally occurring vitamin D.