



# Calcium and Bone Health: What Plant-Based Eaters Need to Know

By Dana Hudepohl  
February 18 2021

If you grew up on milk mustache ads that equated strong bones and [peak athletic performance](#) with drinking milk, you may have a nagging worry that ditching dairy means you're jeopardizing your bone health. But does the science bear out those concerns? Read on for a breakdown of the role calcium plays in bone health, plant-based sources of calcium, and practical tips for preventing osteoporosis.

## Do You Need to Drink Milk for Calcium?

Dairy has long been touted as the optimal source of calcium, the mineral that (along with vitamin D) plays the starring role in strengthening bones and minimizing age-related bone loss. But contrary to popular belief, cows don't have a monopoly on its production.

"The natural source of calcium is plants," says [Neal Barnard, MD, FACC](#), president of the Physicians Committee for Responsible Medicine and author of *Your Body in Balance: The New Science of Food, Hormones, and Health*. "That's where the cow gets it. ... This whole idea of milk for bones is a marketing program. All of our biological cousins—chimpanzees, gorillas, and orangutans—they don't eat ice cream, they don't eat yogurt, they're not eating Velveeta sandwiches, and they also don't have osteoporosis."

"When you look around the world, especially in places like Asia and Africa where they don't historically consume dairy, every culture has found a place to get calcium in their diet," says [Sharon Palmer, MSFS, RDN](#). "It shows that it is possible to have healthy bones without dairy."

That's a good thing, because [numerous studies](#) have linked dairy to increased health risks, including [asthma](#); [heart disease](#); and breast, prostate, and endometrial [cancers](#).

## Vegan Sources of Calcium

In a February 2020 issue of *The New England Journal of Medicine*, a review by Harvard Medical School's Walter Willett, MD, DrPH, and David Ludwig, MD, PhD, concluded that calcium can be obtained from plant foods—and that the majority of scientific evidence doesn't support the common belief that eating dairy reduces bone fractures.

Just like a cow's favorite meal—grass—absorbs calcium from the soil, so do leafy greens, such as Brussels sprouts, collards, and mustard greens, making them rich sources of the mineral as well. Other foods, such as beans, [lentils](#), nuts, seeds, and [soy foods](#) including [tofu](#), provide calcium in smaller amounts that add up.

Some foods are better sources of calcium than others because high levels of oxalate, a natural substance in food that binds to calcium during digestion, can interfere with absorption. Great sources of absorbable calcium include broccoli, [kale](#), bok choy, collard greens, mustard greens, turnip greens, watercress, calcium-set tofu, and fortified plant milk.

Because of high oxalate levels, the bioavailability of calcium is lower in spinach, beet greens, and Swiss chard. That's no reason to avoid these foods; they provide plenty of other beneficial nutrients. "You can never go wrong making a resolution to include an abundance of green leafy vegetables in your diet," Barnard says. "They bring you calcium and so much more," he says.

## Do You Need a Calcium Supplement?

Taking a supplement is not the best solution for protecting bone health, says Katherine Tucker, PhD, director of UMass Lowell's

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Center for Population Health and a professor of nutritional epidemiology who has studied bone health for more than 20 years. The calcium in foods is more effectively used by the bones because it comes packaged with other important nutrients that work in concert. Studies on calcium supplementation have yielded mixed results; some studies have even linked calcium supplements to increased risk of heart disease and heart attack. “The best thing you can do for your bones is to have a healthy diet that includes all of the nutrients you need,” Tucker says.

## Other Nutrients for Bones

Getting enough calcium and vitamin D is critical, but these minerals are not a magic bullet. “During the course of my research, it has been exciting to learn that it’s not only calcium and vitamin D that protect the bones,” says Tucker.

Scientists now know that a complex mix of vitamins, minerals, and phytonutrients work synergistically to maximize bone health. These include protein, vitamin K, vitamin A, vitamin E, vitamin C, phosphorus, iron, silicon, sodium, magnesium, potassium, copper, zinc, folate, vitamin B6, vitamin B12, and omega-3 fatty acids. “Plant-based eaters are off the charts on many of the bone-loving nutrients and get more of them than the average person,” Palmer says.

With the exception of needing to supplement with vitamin B12 and possibly vitamin D (see “More Ways to Protect Your Bones” below), you can boost your bone health by eating a variety of plant foods including green leafy vegetables, nuts and seeds, legumes, whole grains, and soy foods.

## Do Vegans Have More Fractures?

A large observational [study](#) published in November 2020 found that vegan and vegetarian participants had more bone fractures than the meat eaters. The authors used data from the [EPIC-Oxford study](#). Utilizing data on 55,000 people, mostly women, collected over more than 17 years, this study found that the vegans had around 20 more bone fractures per 1,000 people than meat-eaters over a 10-year period.

Part of the difference can likely be attributed to differences in body mass index, since meat eaters are [more likely to be overweight](#) than vegetarians and vegans. Indeed, in a summary of their findings, the study authors stated that the “higher observed risks of fractures in non–meat eaters were usually stronger before BMI adjustment,” noting that “previous studies have reported an inverse association between BMI and some fractures, possibly due to ... the cushioning against impact force during a fall.”

In addition to having a cushioning effect, excess weight can also mean higher bone density, as Garth Davis, MD, explained in his analysis of the study, [posted on social media](#): “The more you weigh, the more dense your bones are, because your body has to support that weight.”

Still, study authors found that vegans and vegetarians had a slightly higher rate of fractures than meat eaters, even when controlling for BMI. More research is needed to understand potential mechanisms behind this. Davis noted that the meat eaters in this study were more likely to use hormone replacement therapy than vegans, bolstering estrogen levels. Although higher levels of estrogen are associated with other health risks, including certain cancers and blood clots, they are a known protector against bone loss. Davis also notes that the paper didn’t address the quality of the vegan and vegetarian diets of the study participants.

The study’s lead author, nutritional epidemiologist Tammy Tong, PhD, said in a statement: “It is worth bearing in mind that well-balanced and predominantly plant-based diets can result in improved nutrient levels and have been linked to lower risks of diseases including heart disease and diabetes. Individuals should take into account the benefits and risks of their diet, and ensure that they have adequate levels of calcium and protein and also maintain a healthy BMI.”

## More Ways to Protect Your Bones

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Beyond eating a variety of plant foods, here are some steps you can take to safeguard the calcium stores in your bones and teeth.

## Do Weight-Bearing Exercise

Weight-bearing exercise—like walking, hiking, jogging, climbing stairs, playing tennis, and dancing—and resistance training help keep your bones strong. Researchers believe that changes in gravity help initiate the process of building up and mineralizing new bone.

## Go Easy On Alcohol

Excessive alcohol intake (more than two drinks a day for men and one drink a day for women) has been shown to interfere with calcium balance in the body, as well as vitamin D production. It's also associated with elevated levels of the stress hormone cortisol and can cause hormone deficiencies, [according to the NIH Osteoporosis and Related Bone Diseases National Resource Center](#).

## Don't Smoke

Studies show a direct relationship between smoking and decreased bone density. Smoking reduces blood flow to the bones, interferes with calcium absorption, and alters hormonal balance.

## Quit Cola

The dark carbonated drink contains phosphate compounds that pull calcium out of the bones in an effort to maintain the delicate balance between calcium and phosphorus in the blood. The Framingham Osteoporosis Study published in 2006 in *The American Journal of Clinical Nutrition* found that people who drink three or more colas a day have lower bone density than those who don't.

## Avoid Processed Foods

Many packaged foods, such as chips, breads, and other baked goods, contain additives to enhance texture and shelf life, like sodium phosphate and calcium phosphate, which can leach calcium from the bones. They also crowd out healthier whole foods that contain bone-protective nutrients. "Every time you choose to eat a junk food meal, you squander the opportunity to nourish your body," Palmer says.

## Get Outside

"Sunlight is nature's source of vitamin D," says Barnard. Vitamin D helps the body absorb calcium and is critical to bone density. Aim for at least 10 minutes of midday sun exposure on your arms, legs, and back (without sunscreen) several days a week. "If you're not getting adequate sun, a vitamin D supplement might be necessary," Barnard says.