

CALCIUM for VEGANS and PLANT-BASED EATERS

People in developed countries have been repeatedly told that we need to drink milk and consume dairy products for bone health. But is this in fact true? Are vegans at greater risk for low calcium levels and subsequent issues with bone health? In a word, NO. However, we must acknowledge that the typical diet of 21st century Westerners often lacks healthy sources of calcium, other than dairy. For that reason, vegans and plant-based eaters should be calcium-aware when making food decisions.

Why does calcium matter?

Iron is the most abundant mineral on earth, but calcium is the most abundant mineral inside our bodies. It is an essential building block of our bones, the individual cells of which are constantly being replaced. Calcium is also required for proper cardiovascular, muscular, and neurological function. The ideal calcium range in our blood is very narrow, and constantly regulated by various biological processes. If too little calcium is coming in, our bodies increase absorption through the gut and decrease losses through urine. If we still don't have enough to sustain our systems' health, we end up digging into our calcium reserves: our bones. Our bodies are intelligent and know which processes to prioritize. A healthy heart is more important than a, hopefully, temporary reduction of calcium in the bones. But if this goes on for too long, bones become weak and brittle.

Why do we need calcium and how much should we get?

The calcium to build our bones and run our cardiovascular system has to come from somewhere. We don't make it. Every nutrition book insists that dietary calcium intake is important, and surely it is... yet the current scientific literature on the topic is confusing.

Official recommendations.

Though it fluctuates between countries, the recommended daily intake of calcium is between 1000 and 1300 mg in North America. In the United Kingdom however the recommended daily intake for most adults is only 700 mg, almost half. China has set the recommended daily amount to 800 mg. Bone health is the most commonly cited justification for those targets. Are the Brits and Chinese somehow that much different from North Americans? No. We just have a stronger dairy lobby influencing recommendations.

What recent scientific studies say.

A useful systematic review and meta-analysis published in the British Medical Journal in 2015 reports that: "Dietary calcium intake is not associated with risk of fracture, and there is no clinical trial evidence that increasing calcium intake from dietary sources prevents fractures. Evidence that calcium supplements prevent fractures is weak and inconsistent." A 2019 review article in the Medical Journal of Australia also did not support supplementation as a way to prevent bone fractures.

However, those are based on studies of developed countries which have a history of dairy consumption. What about emerging countries without a milk habit?

The results of a 2016 Chinese long-term study of calcium intake may surprise North Americans: "A relatively low fracture risk is observed in men with dietary calcium intakes of 275 to 780 mg/d and in women with intakes of 250 to 650 mg/d, and higher intakes may have no further benefit for fracture prevention." In fact, higher calcium intake (800 mg/day and more) might be associated with higher risk of fracture. A more recent study agrees that the seemingly-low calcium intake of Chinese people may very well be sufficient for their needs. None of the studies above were concerned about dietary patterns (omnivore vs. veg*), but there is new evidence arising, and it's not that straightforward.

Vegan bone health and calcium intake.

A solid 2020 publication based on the EPIC-Oxford study showed that vegans were at greater risk of certain types of fractures (notably hip fractures) than vegetarians and meat-eaters. The increased risk was specifically for women. The good news however is that the risk was neutralized for those with a daily intake of at least 525 mg of calcium and a healthy mid-range BMI (22.5 and above). In the study, connections were also drawn to the vegan participants' lower protein intake and lower vitamin B12 and D supplementation, all of which are bone health factors.

Results from the Adventist Health Study 2 reveal a much higher hip fracture rate in female vegans who do not supplement calcium and vitamin D. A paper from the UK Women's Cohort Study indicating that veg eaters (the study combined vegetarians and vegans) suffer hip fractures more, possibly due to insufficient protein consumption (less than 0.75 g per kg per day), lower BMI, and lower B12 and D vitamin intakes. The bone fracture risk for vegans remains a small concern relative to the notable cardio-vascular health benefits of a predominantly plant-based diet.

How to be a bone-aware vegan.

Clearly, calcium matters... to a point. As you can see from the studies cited above, forgoing milk isn't a one-way ticket to the orthopedic surgeon's office! However, bone health is jeopardized by some factors, especially for women:

- Calcium intake under 525 mg per day
- Low weight relative to height (BMI under 22.5)
- Lack of consistent intake of vitamins B12 and D, which is only guaranteed by supplementation.
- Insufficient protein intake (under 0.75 grams per kilo per day)

In addition, other lifestyle factors such as a sedentary lifestyle and excess caffeine, alcohol, and salt consumption can weaken our bones.

North American calcium recommendations (the 1000 mg/day target) have been erring on the side of "more is better" due to caution, but also because of the influence of overt and covert dairy industry lobbying efforts within national food and agriculture organizations (like the USDA) and dietetics associations. In practice, once one reaches a reasonable threshold, about 600 mg calcium per day, additional dietary calcium is not required. For better bone health, vegans and those eating a predominantly plant-based diet also need to pay attention to other plant-based nutrition targets, more specifically ensuring sufficient protein intake (thanks to legumes, whole grains, nuts and seeds, and more) and supplementing vitamins B12 and D. Thinner women may also want to be particularly emphasize preventive bone health, notably with resistance exercise.

Sources of calcium for vegans.

Cows don't make calcium. They get it from the calcium-rich foods they consume. Cows eat grass, legumes, and grains, and make calcium-rich milk, so we shouldn't be surprised to find out that those plant foods have plenty of calcium. Here are the top non-dairy calcium-rich foods for you to enjoy every day and integrate into your weekly meal plans:

Nuts and seeds: Chia seeds (126 mg per 2 Tbsp) and almonds (88 mg per quarter cup) lead the pack.

Dark leafy greens: low-oxalate greens like cruciferous vegetables, such as broccoli, kale and cabbage, offer readily available calcium. High-oxalate greens like spinach and Swiss chard also have calcium, but less of it is absorbed. One cup of chopped green veggies will give you roughly between 50 and 100 mg of calcium.

Calcium-set tofu: tofu that is made with calcium sulfate not only tastes better, but it also has a lot more calcium. The range for firm tofu varies widely, from about 300 to over 1500 mg per cup. Regular tofu has about 1/3rd the amount of calcium, still a decent amount.

Beans: Chickpeas, black beans, and Great Northern beans offer respectively 80, 46, and a whooping 120 mg of calcium per cup. Enjoy edamame beans as an appetizer for an extra 103 mg per cup.

Whole grains: quinoa and oatmeal have a fair bit of calcium with 31 and 21 mg per cup respectively. Rice, even brown rice, however, has very little.

Berries: Some berries have a lot, particularly blackberries (42 mg per cup) and raspberries (31 mg per cup). It's not the case for all berries, but those tiny fruits have a lot of other nutrients in them.

Supplemented foods: Many commercial vegan staples like plant milks and yogurts are supplemented with calcium. Those might be especially valuable for highly selective people who haven't yet developed a taste for dark leafy greens.

In short, the key to boost your calcium as a vegan is to eat a wide variety of foods, with a focus on vegetables, legumes, whole grains, nuts and seeds.

Benefits of plant sources of calcium over dairy milk.

As Dr. Michael Greger wrote in his book *How Not to Die* (2015), our calcium-rich foods of choice don't come with just calcium. The "package" they come with matters. Dairy is the number-one source of calcium in the United States, but it's also the #1 source of saturated fat and cheese is the #1 source of salt as well, not to mention all the added hormones since dairy is breast milk. Whereas the "baggage" that comes with plants includes healthy fiber, folate, iron, and antioxidants, some of the very nutrients lacking in milk.

Avoiding calcium thieves.

Alcohol, caffeine, salt and smoking are known to reduce the efficiency of calcium absorption. There is a lot of debate about the possible benefits of alcohol and caffeinated beverages for health. Humans like to hear good, or equivocal news about their habits, but the fact is that there is really no safe level of alcohol consumption. Caffeinated beverages like coffee or teas are OK as long as you keep the caffeine dose to under 400 mg in total. For some sensitive people who get heart arrhythmias or who have poor sleep, no level is good. Obviously, tobacco consumption in any form is bad at any level.

When it comes to salt, be aware that the majority of salt consumption in the US doesn't come from sprinkling it on your food at the table. It comes from all the processed and canned foods people eat. Just read the package label of the next loaf of bread or can of soup you buy and you will be shocked.

Beyond calcium: exercise and supplements for bone health.

Vitamin D is crucial for healthy bones. Known as the "sunlight" vitamin, it is neither a vitamin, nor are we able to get enough of it from sunlight. Not at least the way most people live these days.

Health is always more complex than the reductionist, single-nutrient lens makes it seem. Many other vitamins and minerals are required for bone health, but thankfully they are also abundant when eating a diet of whole plant foods. The one ingredient that isn't on your plate, but that you shouldn't neglect, is resistance training or weight-bearing exercise. In addition to promoting bone strength, muscle-building exercise also makes the body stronger in general, decreasing the odds of falls.

SUMMARY: Promoting bone health on a plant-based vegan diet

There are three main things to remember when it comes to promoting bone health and preventing fractures on a plant-based vegan diet, beyond just worrying about calcium for vegans:

1. Eating a diverse diet of whole plant foods, focusing on dark leafy greens and legumes, plus nuts and seeds. That should easily take care of getting you over 600 mg of dietary calcium per day, and more like 700 mg, which, based on the research described above, is sufficient for bone health.

2. Adequately supplementing vitamin B12 and vitamin D.
3. Adding daily resistance exercise to your lifestyle, including impact exercise (jogging rather than just walking) or walking with a weighted vest or lifting weights.