Let's start with calcium. This is our best starting place because it is the nutrient we need in the highest quantities and because it may have the highest chance of being harmful.

More than other nutrients, calcium is a double-edged sword. It can protect us, but it can also harm us. The protective side of calcium is mineralization. This is its role in maintaining bone mass and in preventing bone loss. Mineralization is also critical for the growth of tendons and ligaments and for conduction of currents in muscles and nerves.
The main concerns with calcium are whether it causes calcification or lead contamination and how well it is absorbed.

The harmful side of calcium is calcification. Imagine an oyster with a sharp grain of sand inside the shell, irritating its fragile body. To protect itself, the oyster surrounds the sharp piece of sand with layer after layer of smooth calcium. This is called calcification, and it is how pearls are made. The same thing happens inside the human body, although the outcome is not celebrated.

When something is chronically irritated, it can calcify. This is how kidney stones, gallstones, joint calcifications and calcified plaque in the blood vessels form. Calcium does not cause the irritation, but the more calcium there is in circulation, the more it forms around any area of inflammation. [1]

HOW DO YOU PREVENT CALCIUM FROM CAUSING CALCIFICATION?

Part of the prevention is getting enough of the fat-soluble nutrients, vitamins A, D, E and K. They help a protein, called osteocalcin, which acts like a cowboy on a horse during a cattle run—it rounds up calcium and keeps it in the right place. I’ll talk more about it and these nutrients in later installments.
The other thing that matters is which type of calcium you take. Some of the more common types of calcium may not be the best for preventing inflammation. The main types include calcium carbonate (like Tums), coral calcium and algae-derived calcium, bone-derived calcium (like bone broths, MCHC and Bone Up) and calcium chelates (like calcium citrate, calcium lactate and calcium malate).

Calcium carbonate is one of the most common types of calcium found in supplements, either by itself or in combination with other types. Unfortunately, it seems to be the worst in causing cardiovascular plaque growth in populations most at risk.[2]

OVERALL, HOW BIG OF A DEAL IS CALCIFICATION?

Pretty big. In fact, unless you give thought to what type of calcium you take and what you take it with, it is more likely to cause a fatal heart attack than to prevent a hip fracture.[3,4,5]

In terms of calcification, calcium has also been considered a culprit for kidney stone formation. Although some types of calcium have higher levels of risk than others, di-calcium malate prevents kidney stones, even for those at risk for forming calcium-based stones. Another advantage of di-calcium malate is it’s not tied to cardiovascular inflammation.[6]
In living things, lead and calcium go together like peanut butter and jelly. If cows have lead in their feed, it will end up in their bones. This is why I discourage bone broth as a source of calcium. A recent study questioned the safety of bone broth, showing that even when made from organic bones, it could have significant amounts of lead.[7]

Although some have argued the amount of lead in bone broth is not that high, even the tiniest amounts of lead are worth avoiding. The CDC has stated that “No safe blood lead level has been identified,” and it is harmful to the brain, kidneys and blood vessels.[8] Calcium supplements from both bone and unrefined calcium carbonate have the highest levels of lead contamination. [9]
Some types only absorb when the acid in our stomach changes their chemical state through ionization.[10] For people with excellent digestion, adequate vitamin D and healthy diets, this is not a problem. However, calcium absorption can be a problem for the elderly, those taking antacids, those with gluten reactions or other digestive issues, those without enough vitamin D or with stomach acid problems.[11]

Among the types of calcium, citrates (like calcium malate) are better absorbed regardless of digestive function and can be taken with or without food. They also do not compete with iron absorption like other types of calcium.[12]

To summarize, calcium carbonates are good because they are low-cost and highly concentrated; they are bad because they can trigger calcification and are hard to digest. Bone-derived calcium is concentrated and well-absorbed but is high in lead and not cost-effective. Calcium-chelates are less concentrated but are least apt to cause calcification, low in lead and easiest to absorb. Although they may require a higher number of capsules, they are the type of calcium I encourage for general use in multivitamins, especially di-calcium malate since it also prevents kidney stones.


5 Bolland MJ, Grey A, Avenell A, Gamble GD, Reid IR. “Calcium supplements with or without vitamin D and cardiovascular events: reanalysis of the Women’s Health Initiative limited-access dataset and meta-analysis,” BMJ. 2011;342:d2040.


8 Centers For Disease Control and Prevention, “Lead” factsheet, see more at http://www.cdc.gov/biomonitoring/Lead_FactSheet.html

