Calcium: Which Form is Best?

Dietary supplements may contain one of several different forms of calcium. One difference between the various calcium compounds is the percentage of elemental calcium present. A greater percentage of elemental calcium means that fewer tablets will be needed to achieve the desired calcium intake. For instance, in the calcium carbonate form, calcium accounts for 40% of the compound, while the calcium citrate form provides 24% elemental calcium.

Many medical doctors recommend calcium carbonate because it requires the fewest pills to reach a given level of calcium and also because it is readily available and inexpensive. For people concerned about cost and only willing to swallow two to three calcium pills per day, calcium carbonate is a sensible choice. Even for these people, however, low-quality calcium carbonate supplements are less than ideal. Depending on how the tablet is manufactured, some calcium carbonate pills have been found to disintegrate and dissolve improperly, which could interfere with absorption. The disintegration of calcium carbonate pills can be easily evaluated by putting a tablet in a half cup of vinegar and stirring occasionally. After half an hour, no undissolved chunks of tablet should remain at the bottom.

Calcium carbonate may not always show optimal absorption, but it clearly has positive effects. For example,
calcium carbonate appears to be as bioavailable as the calcium found in milk.3 In fact, some studies indicate that calcium carbonate absorbs as well as most other forms besides calcium citrate/malate (CCM).4 5 For example, a recent study found absorption of calcium from calcium carbonate to be virtually identical to absorption of calcium from calcium citrate.6

For people willing to take more pills to achieve a given amount of calcium (typically 800–1,000 mg), calcium carbonate does not appear to be the optimal choice, because other forms have been reported to absorb better (however, they do require more pills per day because each pill contains less calcium). For this reason, some nutritionally oriented doctors recommend other forms of calcium—CCM. Research shows that CCM absorbs better than most other forms.7 8 9 CCM may also be more effective in maintaining bone mass than some other forms of calcium supplements.10 Because of their similarity in both name and structure, CCM can be confused with calcium citrate, but they are not the same.

CCM is not the only form of calcium that might absorb better than carbonate. For example, most,11 12 though not all,13 studies suggest that calcium citrate might have some absorption advantage over calcium carbonate. However, no evidence suggests that calcium citrate absorption equals the absorption from CCM.

Microcrystalline hydroxyapatite (MCHC), a variation on bonemeal, has attracted attention because of studies
reporting increases in bone mass and better effects on bone mass than calcium carbonate. Similar positive studies exist using CCM. However, unlike CCM, MCHC has only occasionally been compared with other forms of calcium. In limited research that does make comparisons, MCHC fared poorly in terms of solubility, absorption, and effect on calcium metabolism.

Remarkably little is known about the relative efficacy of amino acid chelates (pronounced “kee-lates”) of calcium. In the only commonly cited trial, absorption was measured for an amino acid chelate called calcium bisglycinate and compared with absorption from citrate, carbonate, and MCHC. In that trial, the amino acid chelate showed the best absorption, and MCHC the worst. Although CCM was studied in that trial, it was taken under different circumstances than the chelate (with meals), so it is difficult to draw conclusions.

Whatever the form, calcium supplements typically absorb better when eaten with meals. Moreover, research indicates that taking calcium with meals may reduce the risk of kidney stones and supplementing calcium between meals might actually increase the risk.

Besides how to take calcium supplements, scientists have also been studying when to take them. Supplementing calcium in the evening appears better for osteoporosis prevention than taking calcium in the morning, based on the circadian rhythm of bone loss.
What is the relationship between calcium supplements and stomach acid? Years ago, researchers reported that people who do not make hydrochloric acid in their stomachs cannot absorb calcium adequately when the calcium is taken alone. In that report, adding hydrochloric acid restored normal calcium absorption. Although researchers have subsequently confirmed these findings, they have also discovered that these same people absorb calcium normally if they take it with meals. In addition, researchers have noted that giving these people hydrochloric acid does not further improve absorption during meals. Many others have confirmed that hydrochloric acid, either from pills or from the stomach, is unnecessary for the absorption of calcium, as long as the calcium supplement is taken with meals.

References:


