

CALCIUM SUPPLEMENTATION INCREASES BONE DENSITY IN TEENAGE AMERICAN GIRLS

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Osteoporosis is a significant health concern that now affects one in four women by age 50. Women are at higher risk than men of developing osteoporosis as a result of lower peak bone mass and rapid bone loss after menopause, which stems from a decline in estrogen and progesterone secretion. Several studies have shown that high adult peak bone mass is protective against osteoporotic fractures later in life, and that higher intake of calcium in early adult life can enhance bone density and thereby reduce risk of future development of osteoporosis. It has been challenging to establish the levels of calcium, however, that would be appropriate for teenage girls, who are postmenarcheal (have had their first menstrual cycle). In recent years, several studies have reported a positive effect of calcium supplementation on bone mass in children and adolescents. In the November issue of the American Journal of Clinical Nutrition, G. Rozen and fellow researchers published a study showing that supplementation with 1,000 mg per day of calcium carbonate for one year significantly increased bone mineral density in a group of 49 teenage girls compared to the 51 age-matched controls who received the placebo. All the girls in the study were at least 2 years past the onset of menarche (mean age of 14), and had a habitual calcium intake of less than 800 mg per day. Their results showed that a positive effect of calcium supplementation on bone accretion was achieved at an average calcium intake of 1200 mg per day: 500 mg from the diet plus 70% compliance with the supplement, equal to 700 mg per day.

Various studies have shown that American teenage girls have an average intake of calcium that is considerably lower than 1200 mg per day. This sub-optimal calcium intake is a significant factor in future onset osteoporosis, as the age group from 12 to 24 years represents the period in which individuals can most rapidly acquire bone mineral density. As such, it is important to maximize bone accretion during this genetic growth phase by ensuring that all teenage girls, who are postmenarcheal, consume at least 1200 mg of calcium per day from a combination of food and supplements.

Health practitioners should routinely perform a dietary survey on their female patients and the daughters of their patients, who are between the ages of 12 and 24, to establish their habitual calcium intake levels from food sources. Once their calcium intake from food is known, it is prudent to help individuals with sub-optimal intake values to identify good food sources of calcium. However, studies show that teenage girls do not demonstrate ideal compliance with dietary recommendations aimed at preventing the future onset of degenerative diseases that may occur forty years later or more. Thus, the consideration of a calcium supplement offers a convenient option to help ensure that bone accretion rates will proceed during these years in a manner that is conducive to the future prevention of osteoporosis.

Of note is the fact that calcium carbonate and calcium citrate both offer the same bioavailability when taken with meals (approximately 40% absorption). In the study by G Rozen et al, calcium carbonate chewable tablets were used, and compliance over the course of the one-year period was 70%. This is a very good compliance level for this age group. The calcium carbonate supplement was shown to significantly increase total-body bone mineral density after 6 months and 12 months, as assessed by dual-energy X-ray absorptiometry.

A number of holistic health practitioners are reluctant to recommend the use of calcium carbonate, due to an erroneous belief that all calcium carbonate supplements are non-absorbable, or that they form stones within the gastrointestinal tract. Many studies have shown that use of calcium carbonate is an effective means to increase bone density and/or slow calcium loss from bone throughout the life cycle. It has also been shown to be the most cost-effective form of calcium, yielding the greatest amount of elemental calcium per tablet, at the lowest price to the consumer. Unfortunately, a number of nutritional supplement companies have distorted the

science on this subject to suggest that only more expensive forms of calcium can be used to prevent osteoporosis, such as microcrystalline hydroxyapatite (MCHC), calcium citrate, calcium citrate-malate, coral calcium etc. Research in this area does not support using these more expensive forms of calcium in place of calcium carbonate, if cost-effectiveness is to be considered. Much of the marketing hype around more expensive forms of calcium increases profits for the supplement companies who put them into the market place, but evidence continues to show that calcium carbonate works and is cost-effective. A standard search of the available research indicates that the greatest number of human intervention studies performed to date to investigate the effect of calcium supplementation on bone density outcomes, have used calcium carbonate supplementation. By comparison, only a handful of studies have been performed using the alternate forms of calcium supplementation noted above.

In conclusion, health practitioners should seize the opportunity to assess the dietary calcium status of their patients who are teenage women, and the daughters of their patients who are between the ages of 12 and 24, in an effort help them optimize bone accretion during this sensitive genetic phase. This is related to the fact that bone mass can be gained faster during this phase of life than at any other time in the lifecycle. In most instances calcium supplementation will help compensate for the common finding of insufficient calcium intake (below 1200 mg per day). Many forms of calcium are available in the marketplace, which have a bioavailability value of 30-40%, when taken with meals. Of these, calcium carbonate has been shown to be the most cost-effective. Its only drawback is that it is less soluble than calcium citrate and therefore, calcium citrate may be more appropriate for patients with a previous history of kidney stones, although this still remains speculative. In terms of calcium overdose, it is well established that as much as 2,000 mg of calcium per day can be consumed safely from the combination of diet and supplementation, without producing any untoward side effects.

Reference:

1. Rozen G, Renneri G, Dodiuk-Gad R, et al. Calcium supplementation provides an extended window of opportunity for bone mass accretion after menarche. *Am J Clin Nutr.* 2003; 78:993-8

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