CALCIUM SUPPLEMENTS

A high calcium intake combined with vitamin D can increase bone density and reduce the incidence of fractures in older women and probably also in men.

CALCIUM TABLETS

Supplement	Elemental calcium per tablet (mg)	Vitamin D per tablet (IU)	Tablets per day	Cost
Calcium carbonate - generic price	600	200	2	$3.59
Calburst (Nature Made)	500	200	2	6.99
Caltrate +D (Lederle)	600	200	2	5.99
0s-Cal +D (SK Beecham)	500	200	2	5.25
Tums 500 (SK Beecham)	500	0	2	4.49
Viactiv (M,ead Johnson)	500	100	2	6.99
Calcium citrate				
Citracal +D (Mission)	315	200	3	8.24
Calcium Citrate +D (Nature Made)	315	200	3	8.99
Calcium complex (carbonate, lactate, gluconate)				
Calcet (Mission)	150	100	7	14.68
Calcium phosphate				
Posture D (selfcare)	600	125	2	5.99

CALCIUM REQUIREMENTS -The average American consumes less than 800 mg of calcium per day. The Institute of Medicine of the National Academy of Sciences has recommended an intake of 800 mg/day for children 4 to 8 years old, 1300 mg/day for children 9 to 18, 1000 mglday for adults 19 to 50, including pregnant and lactating women, and 1200 mg/day for everyone more than 50 years old, including those taking estrogen or a bisphosphonate.

PREPARATIONS - Calcium supplements are available in a variety of salts. Some are derivatives of natural products, such as oyster shell or bone. Others are marketed mainly as antacids. Calcium carbonate and phosphate preparations have the highest concentration of elemental calcium, about 40%. Calcium citrate contains 21% elemental calcium. Calcium lactate and calcium gluconate contain 13% and 9% elemental calcium.

ABSORPTION - Calcium supplements must be dissolved before they can be absorbed, but most commercial preparations meet the dissolution standards of the US Pharmacopeia (USP). Absorption of calcium is incomplete, usually averaging about 20% to 30%. It requires adequate vitamin D and varies with age, decreasing after

puberty. Taking calcium with food in doses of 500 mg or less increases absorption, particularly in patients with achlorhydria and in those taking an Hp-receptor antagonist or proton pump inhibitor. Some foods containing oxalic or phytic acids, such as spinach, rhubarb, wheat bran and other forms of unrefined flour, can decrease calcium absorption.

Different calcium salts may vary in their absorption. A recent study comparing calcium carbonate and citrate found that when 17 premenopausal women took 300 mg with breakfast, the fractional absorption of calcium carbonate was 34%, and of calcium citrate was 38%. When 10 men and 10 post-menopausal women took 1000 mg of each salt, fractional absorption decreased to 30% with the carbonate and to 27% with the citrate. In 18 post-menopausal women, 500 mg of calcium citrate taken with breakfast produced serum calcium concentrations statistically significantly higher than those found after taking 500 mg of calcium carbonate. A recent meta-analysis found that absorption of calcium citrate was 27% higher than that of calcium carbonate taken on an empty stomach, and 22% higher when taken with meals; these studies included patients of various ages, a wide range of calcium preparations and dosages, and various methods of measuring calcium absorption.

One two-year study in post-menopausal women with low dietary calcium intake compared the effects of calcium carbonate and calcium citrate malate, a calcium salt not commercially available in tablet form but used to fortify some foods. Specially prepared 500-mg tablets of calcium citrate malate were more effective in preventing bone loss than 500-mg tablets of calcium carbonate, but the differences were not statistically significant.

VITAMIN D - Increasing vitamin D intake may enhance calcium absorption from both dietary sources and supplements. The recommended daily intake of vitamin D is 200 IU for adults less than 50 years old, 400 IU for those 51 to 70, and 600 IU for those over 70. Some Medical Letter consultants believe that increasing vitamin D supplementation up to 800 IU per day can further increase calcium absorption. Vitamin D supplementation may be especially important for elderly patients, in whom both skin synthesis and absorption of vitamin D may be impaired.

ADVERSE EFFECTS - Calcium supplements are generally well tolerated. Gastrointestinal effects such as constipation, intestinal bloating and excess gas are frequently reported, particularly with calcium carbonate. Switching preparations or increasing fluid intake may relieve these symptoms. High doses of calcium carbonate can lead to the milk-alkali syndrome, nephrocalcinosis and renal insufficiency.

Patients who form calcium-containing stones in their urinary tract are generally advised not to take calcium supplements, but a low intake of calcium can aggravate the risk of stone formation by increasing absorption and urinary excretion of oxalate. Patients with absorptive hypercalciuria may be at increased risk of stones with high calcium intakes, while those with renal hypercalciuria may have an increased risk of

bone loss with low calcium intakes. Calcium can interfere with absorption of some other minerals and drugs including iron, zinc, bisphosphonates and tetracycline. Some natural calcium products may also contain lead, but the absorption of lead from such preparations is generally low.

CONCLUSION - Patients of both sexes and all ages need an adequate intake of calcium. There is little evidence that any calcium supplement is more effective than any other in preventing osteoporotic fractures. Calcium carbonate may cause more adverse gastrointestinal effects. Calcium citrate may be better absorbed. Taking any calcium supplement in doses of 500 mg or less with meals may improve absorption.

CALCIUM CONTENT OF SOME FOODS*

Food	Serving size	Calcium content (mg)
Milk, skim	1 cup	302
Yogurt (lowfat, fruit-flavored)	8 ounces	300
Gruyere cheese	1 ounce	287
Swiss cheese	1 oz	272
Figs, dried	10 figs	269
Tofu, raw, firm	½ cup	258
Calcium-fortified cereals	¾ cup	250
Cheddar cheese	1 ounce	204
Calcium-fortified orange juice	6 ounces	200
Mozzarella cheese, part-skim	1 oz	183
Collards, cooked from frozen, chopped	½ cup	179
American cheese, processed	1 ounce	174
Blackstrap molasses	1 tablespoon	172
Creamed cottage cheese	1 cup	126
Sardines, canned in oil	2 sardines	92
Parmesan cheese, grated	1 tablespoon	69
Mustard greens	½ cup	52
Kale, boiled	½ cup	47
Broccoli, boiled	½ cup	36

* From JAT Pennington, *Bowes and Church's Food Values of Portions Commonly Used*, 17th ed, Philadelphia:Lippincott, 1998