

Calcium Supplements

Key points

- The recommended daily intake of calcium as recommended by Healthy Bones Australia (formerly Osteoporosis Australia) is 1300mg daily for women over the age of 50 and men over the age of 70, and 1000mg daily for other adults. Ideally most of this should be from dietary sources
- Calcium supplements result in a marginal reduction in fracture risk, with evidence considered weak and inconsistent
- The routine use of calcium supplements is not recommended
- Whether calcium supplements lead to an increased risk of cardiovascular disease is unclear; if dietary calcium is inadequate then calcium supplements containing 500-600mg daily can be used
- Calcium citrate is the preferred supplement with co-existent proton pump inhibitor or H2 antagonist use

Background

Osteoporotic fractures are a common problem worldwide and are associated with increased morbidity and mortality. Calcium is a major component of the skeleton and traditionally calcium supplements have been considered an integral part of osteoporosis management. Furthermore, most studies of osteoporosis therapies have been performed with the use of concurrent calcium supplements. In recent years, the role of calcium supplements has been controversial, particularly whether they lead to an increased risk of cardiovascular disease.

Calcium and fracture risk

Multiple studies have addressed the effect of calcium supplements with or without Vitamin D on fracture risk. While several studies shown a benefit on bone mineral density, the results on fracture reduction are conflicting (1,2,3). A meta-analysis of 17 trials with fracture as the primary outcome showed a modest relative risk reduction of borderline statistical significance (4). In a systematic review of 26 trials (5), there were again small and inconsistent beneficial reductions in fracture risk. Because of the minimal, if any, reduction in fracture risk, it means large numbers of patients would need to be treated to prevent a single fracture.

The conflicting results have been attributed to differences in their definitions of fracture and study designs, study bias and the populations studied (6). The beneficial effects of

www.menopause.org.au

Note: Medical and scientific information provided and endorsed by the Australasia Menopause Society might not be relevant to particular person's circumstances and should always be discussed with that person's own healthcare provider. This Information Sheet may contain copyright or otherwise protected material. Reproduction of this Information Sheet by Australasian Menopause Society Members and other health professionals for clinical practice is permissible. Any other use of this information (hardcopy and electronic versions) must be agreed to and approved by the Australasian Menopause Society. ID: 2021-09-27

calcium and Vitamin D appear to be greater in individuals who are hospitalized or institutionalized compared to those in the community (7).

Which supplements are available?

Calcium carbonate (Caltrate®) and calcium citrate (Citracal®) are the most widely available supplements. Calcium carbonate is better absorbed when taken with meals. It is not well absorbed however in patients with achlorhydria (low acid environment); calcium citrate is therefore preferred as a first line option for patients taking proton pump inhibitors or H2 blockers.

Side effects

High doses of calcium supplements may result in the formation of kidney stones. There is no evidence of an increased risk of nephrolithiasis from high dietary calcium intake. In the Women's Health Initiative, women on calcium and Vitamin D supplements reported a higher rate of urinary tract stone formation compared to placebo (8). Gastrointestinal side effects such as nausea, vomiting and constipation have also been reported.

Calcium supplements and cardiovascular disease

In 2008, the Auckland calcium study reported an increased risk of myocardial infarction in post-menopausal women taking calcium supplements for 5 years compared to placebo (9). Of note, women were taking 1000mg of elemental calcium, 10% of the study population were > 80 years old at baseline and cardiovascular disease was not the primary endpoint. Vascular calcification is one postulated mechanism behind the increased cardiovascular risk.

The Women's Health Initiative which randomized 36,282 women to calcium supplements (1000mg) and Vitamin D (400 IU) daily or placebo showed no increase in myocardial infarction in the calcium supplement group (8). However, 54% of the study population were already taking personal calcium supplements which were not part of the study protocol (10).

Subsequently, several meta-analyses including re-analysis of the WHI (including only women who were not taking calcium supplements at baseline) have been published with conflicting data (10,11,12). At present this topic remains a source of debate and there is insufficient evidence to declare one way or the other whether calcium supplements increase myocardial infarction or not. In light of the modest potential fracture benefit and possible cardiovascular risk, widespread use of supplements is not recommended.

What is clear is that calcium from dietary sources do not lead to an increased cardiovascular risk. Healthy Bones Australia recommends the optimal calcium intake to be 1000mg in adults > 19 years and 1300mg daily in post-menopausal women and men over 70. Most of this should be obtained through dietary sources. If dietary sources are

www.menopause.org.au

Note: Medical and scientific information provided and endorsed by the Australasia Menopause Society might not be relevant to particular person's circumstances and should always be discussed with that person's own healthcare provider. This Information Sheet may contain copyright or otherwise protected material. Reproduction of this Information Sheet by Australasian Menopause Society Members and other health professionals for clinical practice is permissible. Any other use of this information (hardcopy and electronic versions) must be agreed to and approved by the Australasian Menopause Society. ID: 2021-09-27

inadequate, then supplements in the order of 500 – 600mg daily can be used. It is also recommended that calcium intake should not exceed more than 2000mg daily.

Useful links for calcium content in food:

<https://healthybonesaustralia.org.au/your-bone-health/calcium/>

<https://www.osteoporosis.foundation/educational-hub/topic/calcium/list-of-calcium-content-of-common-foods>

References

1. Silk LN et al. The Effect of Calcium or Calcium and Vitamin D Supplementation on Bone Mineral Density in Healthy Males: A Systematic Review and Meta-Analysis. *International Journal of sport nutrition and exercise metabolism* 2015; 25: 510-524
2. Boonen S et al. Addressing the musculoskeletal components of fracture risk with calcium and Vitamin D: A Review of the Evidence. *Calcific Tissue Int Clin Endo* 2006;78:257-270
3. Tai V et al Calcium intake and bone mineral density: systematic review and meta-analysis. *BMJ* 2015;h4183
4. Tang et al. Use of calcium or calcium in combination with Vitamin D supplementation to prevent fractures and bone loss in people aged 50 years and older: a meta-analysis. *Lancet* 2007;370: 657-666
5. Bolland M et al. Calcium intake and risk of fracture. *BMJ* 2015; 351:h4580
6. Chiodini I et al. Calcium supplementation in osteoporosis: useful or harmful? *European Journal of Endocrinology* 2018;178:D13-D25
7. Chung M et al. Vitamin D with or without calcium supplementation for the prevention of cancer and fractures: an updated meta-analysis for the US Preventive Services Task Force. *Ann Int Med* 2011;155:827
8. Jackson RD et al. Calcium and Vitamin D supplementation and the risk of fractures. *NEJM* 2006;354:669-683
9. Bolland MJ et al. Vascular events in healthy older women receiving calcium supplementation: randomized controlled trial. *BMJ* 2008 336: 262-266
10. Bolland MJ et al. Calcium supplements with or without Vitamin D and risk of cardiovascular events; reanalysis of the Women's Health Initiative limited access dataset and meta-analysis. *BMJ* 2011;342:d2040
11. Wang L et al. Systematic Review: Vitamin D and Calcium supplementation in the prevention of Cardiovascular events. *Annals of Internal Medicine* 2010;152:315-323
12. Harvey NC et al. Calcium and Vitamin D supplementation are not associated with risk of Incident Ischemic Events or Death: Findings from the UK Biobank Cohort. *J Bone and Mineral Res.* 2018; 33:808

www.menopause.org.au

Note: Medical and scientific information provided and endorsed by the Australasia Menopause Society might not be relevant to particular person's circumstances and should always be discussed with that person's own healthcare provider. This Information Sheet may contain copyright or otherwise protected material. Reproduction of this Information Sheet by Australasian Menopause Society Members and other health professionals for clinical practice is permissible. Any other use of this information (hardcopy and electronic versions) must be agreed to and approved by the Australasian Menopause Society. ID: 2021-09-27