

Calcium Supplement

Supplement Overview

- > Calcium is most abundant mineral in our diets. About 1% of the calcium in our bodies is used to support metabolic functions including muscle contraction. The other 99% is found in our bones and teeth where it provides both a structural and functional role. Bone is a dynamic tissue that is constantly being broken down and rebuilt. The balance between bone resorption and rebuilding determines whether there is an increase in bone mass (childhood and adolescence), a relative balance of the peak bone mass achieved in adulthood or bone loss (ageing, especially in post-menopausal women).
- > In the absence of specific RDIs for athletes, the population guidelines for calcium intake are used

Australian Recommended Dietary Intakes (RDI) for calcium

Group	Calcium (mg/day)
Boys (14-18 yr old)	1300
Girls (14-18 yr old)	1300
Men (19-30 yr old)	1000
Women (19-30 yr old)	1000

(National Health and Medical Research Centre, 2005)

- > Optimal bone health requires weight bearing exercise and a complex nutritional support system including adequate energy and calcium intake, and good vitamin D status.
- > Calcium requirements are elevated by growth in childhood and adolescence. Inadequate calcium intake during adolescence and early adulthood may lead to sub-optimal bone health due to a failure to gain optimal peak bone mass by ages 25-30. Inadequate calcium intake in adults may lead to exacerbated bone loss.
- > Low energy availability – inadequate energy intake and/or high energy requirements, directly impairs the balance between bone loss and reformation. It also contributes to disturbed menstrual function and hormonal balance in female athletes which has a further negative effect on calcium balance and bone health. An increased calcium intake may help to improve calcium balance in female athletes with impaired menstrual status (1500 mg/d) but may not completely restore bone health.
- > Some athletes are at risk of sub-optimal calcium intakes or poor bone health:
 - Athletes with low calcium intakes due to inadequate energy intake, or inadequate intake of dairy and fortified soy products.
 - Athletes with poor calcium balance due to conditions involving malabsorption from the small bowel such as coeliac disease and inflammatory bowel disease.
 - Athletes with low energy availability due to restricted energy intake and/or high energy requirements.
 - Female athletes with impaired menstrual function (i.e. failure to start menses, secondary amenorrhoea, menopause).
- > The scientific literature provides unclear findings on the effects of calcium intake/ supplementation on the achievement and maintenance of bone health or the prevention of bone overuse injuries. Several prospective studies in female athletes show that elevated calcium intakes (> 1500 mg/d) enhance bone mineral density and reduce the incidence of stress fractures. The results of retrospective and cross-sectional studies are mixed, however, and there are few studies on adolescent and male athletes (for review, see Tenforde et al., 2010).

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- > Most studies focus on issues of bone health in female athletes due to the well-recognised characteristics of low energy availability and impaired menstrual function within the female athlete triad (Nattiv et al., 2007). However, reduced bone density or disturbances in bone health have also been found in male athletes with risk factors including non-weight bearing sporting activities (e.g. cycling [Medelli et al., 2009]), energy restriction or weight making practices, and low vitamin D status.
- > The effect of calcium losses in sweat on calcium balance is unclear but warrants further investigation. Several studies have suggested that the acute loss of calcium in sweat during exercise (cycling) increases parathyroid hormone activity levels to try to defend blood ionic calcium concentrations by increasing calcium resorption from bone. Furthermore, the intake of calcium before/during this exercise can reduce this effect, potentially defending bone health.

Supplement Profile

- > Calcium supplements are typically provided in the form of calcium carbonate, although calcium citrate, phosphate and gluconate are also available. Calcium carbonate is generally well tolerated and well absorbed in doses < 500 mg. Higher absorption from supplemental intakes > 500-600 mg/d can be achieved by splitting the dose over the day.
- > High potency calcium supplements typically provide 500-1000 mg per serve.
- > Some calcium supplements also provide a source of Vitamin D.

Situations for Use in Sport

- > Should be used under medical supervision as part of an integrated program for bone health.
 - Individuals at risk of consuming an inadequate calcium intake in their diet
 - Individuals who have conditions involving gut malabsorption as determined by a sports physician.
 - Individuals who have elevated calcium requirements as determined by a sports physician.

Concerns Associated with Supplement Use

- > Calcium supplementation does not guarantee bone health in the absence of adequate hormonal status, good energy availability, good management of gastrointestinal malabsorption syndromes and weight-bearing exercise.
- > Athletes identified with disordered eating or eating disorders require significant treatment to overcome issues relating to long term bone health.

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Further reading

Medelli J, Lounana J, Menuet JJ, Shabani M, Cordero-MacIntyre Z. Is osteopenia a health risk in professional cyclists? *J Clin Densitom.* 2009; 12: 28-34.

National Institutes of Health: Office of Dietary Supplements. Dietary Supplement Fact sheet: calcium
<http://ods.od.nih.gov/factsheets/calcium/>

Nattiv A, Loucks AB, Manore MM, Sanborn CF, Sundgot-Borgen J, Warren MP; American College of Sports Medicine
American College of Sports Medicine position stand. The female athlete triad. *Med Sci Sports Exerc.* 2007;
39: 1867-1882.

Tenforde AS, Sayres LC, Sainani KL, Fredericson M. Evaluating the relationship of calcium and vitamin D in the prevention of stress fracture injuries in the young athlete: a review of the literature. *P M R.* 2010; 2: 945-949.

This Fact Sheet was prepared by AIS Sports Nutrition as part of the Sports Supplement Framework (www.ausport.gov.au/ais/nutrition/supplements). Note that a Fact Sheet with additional information on this topic is available for Members of the Sports Supplement Framework via the Clearinghouse.

The Sports Supplement Framework has been designed to provide a framework for NSO athletes and specific Sports Supplement Programs may be available to NSO athletes through their NSO. All attempts are made to stay abreast of scientific knowledge and of WADA issues related to anti-doping. It is recommended that other athletes and groups should seek independent advice before using any supplement, and that all athletes consult the WADA List of Prohibited Substances and Methods before making decisions about the use of supplement products.

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