



## Position Statement On

### Bone Health

The Complete Health Improvement Program (CHIP) promotes the wholefood plant-based diet eating pattern for optimal bone health. This position statement discusses the reasons for this recommendation.

#### Key messages

- *Bone health is not just impacted by the amount of calcium you consume, but also in how much vitamin D, vitamin K, folate, potassium, magnesium, and protein you eat*
- *Eating a wide variety of whole foods will supply all the nutrients needed for bone health*
- *Use caution when taking Calcium supplements, and always work with a physician familiar with lifestyle medicine.*

#### Bone Health

The maintenance of bone health is a complex process and far from completely understood; it would seem to depend on more than just the intake of protein and calcium; bone health is also influenced by vitamin D, vitamin K, folate, potassium, and magnesium. [1]. Vitamin D is the major regulator of calcium homeostasis, increasing calcium absorption from food. It would appear that provided the calcium and vitamin D intake of vegans is adequate, the plant foods in their diet are likely to provide the other nutrients necessary for bone health. [2] Furthermore, adequate vitamin B12 status, independent of vitamin D status appears to be important for bone health in vegetarians [3]. Vitamin K status is associated with risk of hip fracture and is also a predictor of bone mass density (BMD). [1] The risk of hip fracture has been shown to decrease 45% with one or more serves of green leafy vegetable (main source of vitamin K) per week compared to less than one serve per week. [2] Homocysteine levels have been associated with risk of osteoporotic fracture. [4] Blood levels of homocysteine are normalized by folic acid (found in a range of plant foods, particularly leafy green vegetables). Potassium and magnesium are also major components of bones, with magnesium influencing the effect of parathyroid hormone. Sodium chloride appears to affect the acid-base status independent of the net acid load of the diet. [2] Increasing sodium chloride intake, as typically found in the western diet, decreases blood pH and bicarbonate levels. [2] This has implications for bone calcium balance as high calcium intakes only produce a positive balance when sodium levels are low. [2]

These results suggest that a good quality diet of fruit and vegetables will provide the intakes of magnesium, potassium, calcium, and vitamins K, B12 and D, which are necessary for bone health. Therefore, CHIP which advocates a whole plant-based diet with an abundance of fruit and vegetables is likely to be as beneficial on bone health as it is for other chronic diseases; particularly those related to the circulatory system.

The consumption of calcium supplements is controversial and advised only where the potential benefits outweigh the possible risks. A meta-analysis of prospective cohort and randomized controlled trials showed no protective effect of calcium supplementation on hip fracture and possibly a detrimental effect, suggesting the

need for addition of vitamin D. [5] A large scale study involving calcium and vitamin D supplementation of women showed a small improvement in hip bone density but no significant reduction in hip fracture; however the risk for kidney stones also increased. [6] This was probably mediated through spurts of hypercalciuria (high calcium in the blood). [7] Of more concern, however, is the evidence for the increased risk of myocardial infarction (MI) and stroke with calcium supplementation (with or without vitamin D). [8,9] A large scale European study found an 86% increase in MI among people who took calcium supplementation regularly compared with those who took no supplements, but found no significant cardiovascular benefits from increasing dietary calcium intake. [10] Furthermore, a recent editorial in BMJ reviewed the substantial evidence for the link between calcium supplementation (with and without vitamin D) and reported that high serum calcium levels are associated with increased risk of vascular calcification, carotid artery atheroma, cardiovascular events and mortality. [7] This effect was not seen with calcium intake from diet, possibly because consumption tended to be in small amounts spread throughout the day, usually together with fat and protein, resulting in slow calcium absorption and more consistent serum calcium levels. [7]

CHIP maintains the view that consuming a wide variety of whole foods including legumes, whole grains, fruits, vegetables, and some nuts will give optimal nutrition for bone health, but always work with physician on what is the best way to manage medications already taking. It is always a good idea to find a doctor who practices lifestyle medicine or responsible medicine.

## References

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