

Boron Overview

Boron is a trace element which has an important influence on both calcium and magnesium metabolism. Boron is concentrated in the bone, spleen, and thyroid indicating boron's functions in bone metabolism and suggesting a potential role for boron in hormone metabolism. Boron is thought to be useful to increase muscle mass; increase muscle strength; maintain bone density; improve calcium absorption; decrease body fat.

According to the USDA, boron is a trace mineral that helps bones develop and grow normally. Boron becomes especially important when there is not enough vitamin D in the diet. Boron may also prevent arthritis in the elderly.

Research has shown that low boron diets have been associated with reduced testosterone levels and boron supplements have been shown to increase serum levels of testosterone in postmenopausal women. This finding caused an increase in boron supplements targeting athletes and bodybuilders for boosting testosterone levels, strength and muscle mass. However, specific research on athletes has not yet confirmed this association that boron alone will boost testosterone.

Dietary Sources: Dried fruits, nuts, dark green leafy vegetables, applesauce, grape juice, and cooked dried beans and peas. Meat and fish are poor dietary sources of boron. One mg of boron is found in 1.5 ounces of raisins or prunes; 2 ounces of almonds or peanuts; 4 ounces of red wine

Dosage: Daily needs for boron probably fall somewhere around 1 mg.

Side Effects: 1-10 mg per day is considered safe, but caution is warranted at higher intake levels as consumption of 50 mg or more may be linked to toxicity, loss of appetite, nausea, vomiting, skin rashes, lethargy, and diarrhea.

(Source: <http://www.nal.usda.gov/ttic/tektran/data/000009/61/0000096130.html> and www.supplementwatch.com)

Research Overview

A review of animal and human research on boron yielded the following information which points to a much more comprehensive view of boron.

Deficiency in boron has been shown to contribute to:

1. Abnormal embryo development
2. Decreased sperm count
3. Ovarian deterioration
4. Damage in reproductive function
5. Decrease in electrical activity in the brain
6. Sub optimal mineral metabolism
7. Poor manual dexterity
8. Impaired hand-eye coordination

Boron supplementation was found to:

1. Increase steroid hormone levels (testosterone) and therefore may be of interest to athletes
2. Increase bone growth and strength
3. Augment estrogen function and therefore may help prevent atherosclerosis
4. Improve brain function and cognitive functioning
5. Reduce HDL cholesterol
6. Affect thyroid hormone levels
7. Alleviate harmful effects of vitamin D, magnesium, and potassium deficiency in postmenopausal bone loss
8. Play a role in the prevention of osteoporosis
9. Be of benefit in the treatment of arthritis
10. Prevents calcium loss in postmenopausal women

Some information about Boron:

1. Dried prunes are a good source of boron
2. The bones of humans using boron supplement are harder to cut
3. Research indicates that areas of the world with highest intake of dietary boron have the lowest incidence of arthritis

4. Boron increased life span in animal studies
5. Boron works synergistically with calcium and magnesium
6. Boron balances vitamin D3 deficiency
7. Boron contributes to growth cartilage maturation

Boron Citations (38)

Boron: 38 Citations

1: Hideghety K, Sauerwein W, Wittig A, Gotz C, Paquis P, Grochulla F, Haselsberger K, Wolbers J, Moss R, Huiskamp R, Fankhauser H, de Vries M, Gabel D.

Tissue uptake of BSH in patients with glioblastoma in the EORTC 11961 phase I BNCT trial.

J Neurooncol. 2003 Mar-Apr;62(1-2):145-56.

PMID: 12749710

2: Gibson CR, Staubus AE, Barth RF, Yang W, Ferketich AK, Moeschberger MM.

Pharmacokinetics of sodium borocaptate: a critical assessment of dosing paradigms for boron neutron capture therapy.

J Neurooncol. 2003 Mar-Apr;62(1-2):157-69.

PMID: 12749711

3: Wallace JM, Hannon-Fletcher MP, Robson PJ, Gilmore WS, Hubbard SA, Strain JJ.

Boron supplementation and activated factor VII in healthy men.

Eur J Clin Nutr. 2002 Nov;56(11):1102-7.

PMID: 12428176

4: Pan XQ, Wang H, Lee RJ.

Boron delivery to a murine lung carcinoma using folate receptor-targeted liposomes.

Anticancer Res. 2002 May-Jun;22(3):1629-33.

PMID: 12168846

5: Yanagie H, Kobayashi H, Takeda Y, Yoshizaki I, Nonaka Y, Naka S, Nojiri A, Shinikawa H, Furuya Y, Niwa H, Arika K, Yasuhara H, Eriguchi M.

Inhibition of growth of human breast cancer cells in culture by neutron capture using liposomes containing ^{10}B .

Biomed Pharmacother. 2002 Mar;56(2):93-9.

PMID: 12000141

6: Fort DJ, Rogers RL, McLaughlin DW, Sellers CM, Schlekot CL.

Impact of boron deficiency on *Xenopus laevis*: a summary of biological effects and potential biochemical roles.

Biol Trace Elem Res. 2002 Winter;90(1-3):117-42. Review.

PMID: 12666830

7: Armstrong TA, Spears JW.

Effect of dietary boron on growth performance, calcium and phosphorus metabolism, and bone mechanical properties in growing barrows.

J Anim Sci. 2001 Dec;79(12):3120-7.

PMID: 11811468

8: Kurtoglu V, Kurtoglu F, Coskun B.

Effects of boron supplementation of adequate and inadequate vitamin D₃-containing diet on performance and serum biochemical characters of broiler chickens.

Res Vet Sci. 2001 Dec;71(3):183-7.

PMID: 11798292

9: Smith DR, Chandra S, Barth RF, Yang W, Joel DD, Coderre JA.

Quantitative imaging and microlocalization of boron-10 in brain tumors and infiltrating tumor cells by SIMS ion microscopy: relevance to neutron capture therapy.

Cancer Res. 2001 Nov 15;61(22):8179-87.

PMID: 11719448

10: Sheng MH, Taper LJ, Veit H, Thomas EA, Ritchey SJ, Lau KH.

Dietary boron supplementation enhances the effects of estrogen on bone mineral balance in ovariectomized rats.

Biol Trace Elem Res. 2001 Jul;81(1):29-45.

PMID: 11508330

11: Armstrong TA, Spears JW, Lloyd KE.

Inflammatory response, growth, and thyroid hormone concentrations are affected by long-term boron supplementation in gilts.

J Anim Sci. 2001 Jun;79(6):1549-56.

PMID: 11424693

12: Schaafsma A, de Vries PJ, Saris WH.
Delay of natural bone loss by higher intakes of specific minerals and vitamins.
Crit Rev Food Sci Nutr. 2001 May;41(4):225-49. Review.
PMID: 11401244

13: Stacewicz-Sapuntzakis M, Bowen PE, Hussain EA, Damayanti-Wood BI, Farnsworth NR.
Chemical composition and potential health effects of prunes: a functional food?
Crit Rev Food Sci Nutr. 2001 May;41(4):251-86. Review.
PMID: 11401245

14: Sheng MH, Taper LJ, Veit H, Qian H, Ritchey SJ, Lau KH.
Dietary boron supplementation enhanced the action of estrogen, but not that of parathyroid hormone, to improve trabecular bone quality in ovariectomized rats.
Biol Trace Elem Res. 2001 Summer;82(1-3):109-23.
PMID: 11697760

15: Armstrong TA, Spears JW, Crenshaw TD, Nielsen FH.
Boron supplementation of a semipurified diet for weanling pigs improves feed efficiency and bone strength characteristics and alters plasma lipid metabolites.
J Nutr. 2000 Oct;130(10):2575-81.
PMID: 11015492

16: Fort DJ, Stover EL, Strong PL, Murray FJ, Keen CL.
Chronic feeding of a low boron diet adversely affects reproduction and development in *Xenopus laevis*.
J Nutr. 1999 Nov;129(11):2055-60.
PMID: 10539784

17: Gaby AR.
Natural treatments for osteoarthritis.
Altern Med Rev. 1999 Oct;4(5):330-41. Review.
PMID: 10559548

18: Naghii MR.
The significance of dietary boron, with particular reference to athletes.
Nutr Health. 1999;13(1):31-7. Review.
PMID: 10376277

19: Sayli BS.
An assessment of fertility in boron-exposed Turkish subpopulations: 2. Evidence that boron has no effect on human reproduction.
Biol Trace Elem Res. 1998 Winter;66(1-3):409-22.
PMID: 10050934

20: Penland JG.
The importance of boron nutrition for brain and psychological function.
Biol Trace Elem Res. 1998 Winter;66(1-3):299-317. Review.
PMID: 10050926

21: Lanoue L, Taubeneck MW, Muniz J, Hanna LA, Strong PL, Murray FJ, Nielsen FH, Hunt CD, Keen CL.
Assessing the effects of low boron diets on embryonic and fetal development in rodents using in vitro and in vivo model systems.
Biol Trace Elem Res. 1998 Winter;66(1-3):271-98.
PMID: 10050925

22: Fort DJ, Propst TL, Stover EL, Strong PL, Murray FJ.
Adverse reproductive and developmental effects in *Xenopus* from insufficient boron.
Biol Trace Elem Res. 1998 Winter;66(1-3):237-59.
PMID: 10050923

23: Samman S, Naghii MR, Lyons Wall PM, Verus AP.
The nutritional and metabolic effects of boron in humans and animals.
Biol Trace Elem Res. 1998 Winter;66(1-3):227-35. Review.
PMID: 10050922

24: Hunt CD.
Regulation of enzymatic activity: one possible role of dietary boron in higher animals and humans.
Biol Trace Elem Res. 1998 Winter;66(1-3):205-25. Review.
PMID: 10050921

25: Sutherland B, Strong P, King JC.
Determining human dietary requirements for boron.
Biol Trace Elem Res. 1998 Winter;66(1-3):193-204.
PMID: 10050920

26: Hunt CD, Herbel JL, Nielsen FH.
Metabolic responses of postmenopausal women to supplemental dietary boron and aluminum during usual and low magnesium intake: boron, calcium, and magnesium absorption and retention and blood mineral concentrations.
Am J Clin Nutr. 1997 Mar;65(3):803-13.
PMID: 9062533

27: Wilson JH, Ruzsler PL.
Effects of boron on growing pullets.
Biol Trace Elem Res. 1997 Mar;56(3):287-94.
PMID: 9197925

28: Naghii MR, Samman S.
The effect of boron supplementation on its urinary excretion and selected cardiovascular risk factors in healthy male subjects.
Biol Trace Elem Res. 1997 Mar;56(3):273-86.
PMID: 9197924

29: Naghii MR, Wall PM, Samman S.
The boron content of selected foods and the estimation of its daily intake among free-living subjects.
J Am Coll Nutr. 1996 Dec;15(6):614-9.
PMID: 8951740

30: Meacham SL, Taper LJ, Volpe SL.
Effect of boron supplementation on blood and urinary calcium, magnesium, and phosphorus, and urinary boron in athletic and sedentary women.
Am J Clin Nutr. 1995 Feb;61(2):341-5.
PMID: 7840072

31: Hunt CD.
The biochemical effects of physiologic amounts of dietary boron in animal nutrition models.
Environ Health Perspect. 1994 Nov;102 Suppl 7:35-43. Review.
PMID: 7889878

32: Penland JG.
Dietary boron, brain function, and cognitive performance.
Environ Health Perspect. 1994 Nov;102 Suppl 7:65-72.
PMID: 7889884

33: Newnham RE.
Essentiality of boron for healthy bones and joints.
Environ Health Perspect. 1994 Nov;102 Suppl 7:83-5.
PMID: 7889887

34: Meacham SL, Taper LJ, Volpe SL.
Effects of boron supplementation on bone mineral density and dietary, blood, and urinary calcium, phosphorus, magnesium, and boron in female athletes.
Environ Health Perspect. 1994 Nov;102 Suppl 7:79-82.
PMID: 7889886

35: Hunt CD, Herbel JL, Idso JP.
Dietary boron modifies the effects of vitamin D3 nutrition on indices of energy substrate utilization and mineral metabolism in the chick.
J Bone Miner Res. 1994 Feb;9(2):171-82.

PMID: 8140930

36: Nielsen FH.

New essential trace elements for the life sciences.

Biol Trace Elem Res. 1990 Jul-Dec;26-27:599-611.

PMID: 1704767

37: Massie HR, Whitney SJ, Aiello VR, Sternick SM.

Changes in boron concentration during development and ageing of Drosophila and effect of dietary boron on life span.

Mech Ageing Dev. 1990 Mar 31;53(1):1-7.

PMID: 2325439

38: Nielsen FH, Hunt CD, Mullen LM, Hunt JR.

Effect of dietary boron on mineral, estrogen, and testosterone metabolism in postmenopausal women.

FASEB J. 1987 Nov;1(5):394-7.

PMID: 3678698

All Contents Copyright © 1995-2009 Life Extension Foundation All rights reserved.

LifeExtension®

These statements have not been evaluated by the FDA. These products are not intended to diagnose, treat, cure or prevent any disease. The information provided on this site is for informational purposes only and is not intended as a substitute for advice from your physician or other health care professional or any information contained on or in any product label or packaging. You should not use the information on this site for diagnosis or treatment of any health problem or for prescription of any medication or other treatment. You should consult with a healthcare professional before starting any diet, exercise or supplementation program, before taking any medication, or if you have or suspect you might have a health problem. You should not stop taking any medication without first consulting your physician.