

BONE DEEP: Everything that matters for better bone health!

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Calcium-rich foods that improve bone health

- Dairy (milk, cheese, yogurt, cottage cheese), beans, soy, lentils, canned sardines/salmon with bones, almonds, seeds
- Low-Oxalate Leafy Greens: arugula, Bok Choy, collard greens, kale (high oxalates in spinach)
- Kelp, broccoli, winter squash (acorn, butternut), oranges, figs

Supplements that support bone health *(supplement dose individualized)*

- Calcium...FOOD FIRST, then supplementation ideally limited to ~600mg (if needed) (RDA varies by age)
 - Calcium carbonate: poor absorption and increases constipation; most commonly used in fortified foods/TUMS
 - Calcium citrate: better absorption; calcium citrate-malate even better
 - Microcrystalline hydroxyapatite (MCHA): highly absorbable form of calcium containing natural ratio's of bone minerals and growth factors that can increase bone growth
 - Algae: Lithothamnion is a red algae rich in calcium, magnesium and trace minerals; studies show increased bone density with supplementation; not high in toxins like other algae species
 - Bone meal/oyster shell: similar to MCHA, BUT may be higher in lead (grass-fed cattle is a better source)
- Vitamin D...active form as D3 common supp ~2,000+ IU/day (newer rec. 2,000 IU/day)
 - Vitamin D3: 1000IU in 10-15min of sun exposure in spring/summer
 - Vitamin D3 food sources: fatty fish/fish oil (most), liver/organ meats, egg yolks, cheese
- Vitamin K...active form as K2 (avoid supplementation if take blood thinner medication)
 - No RDA; supp~100-300mcg/day adults; 45mcg safe for kids <12yo (K7 longest half-life)
 - Vitamin K1: found in leafy green vegetables
 - Vitamin K2: found in fermented foods (sauerkraut, miso), cheese, liver, chicken, butter, egg yolk
- Magnesium...Rule of thumb: 2:1 ratio, calcium to magnesium; common Supplement 320-420mg/day
 - Magnesium Carbonate: not absorbed well and increases constipation
 - Magnesium Oxide: not absorbed well and increases loose stool
 - Magnesium Citrate: absorbed better than those above and more gentle effect to relieve constipation
 - Magnesium Aspartate: well-absorbed and often used for chronic fatigue syndrome (w/potassium)
 - Magnesium Malate: well-absorbed for energy production
 - Magnesium Taurate: well-absorbed; crosses blood-brain barrier to calm nervous system
 - Magnesium Threonate: well-absorbed; crosses blood-brain barrier to improve memory & learning
 - Magnesium Glycinate: well-absorbed and improves sleep & glutathione production
- Boron...Daily dose to support bone health = 3 mg (safe upper limit is 20mg for adults)
 - Food sources: fruit, avocado, potatoes, peanuts, beans, green peas, coffee, milk...supp usually not essential

- Zinc...15 mg is needed to increase bone density with 1 mg copper (take apart from calcium for better absorption)
 - Food sources: meat, fish, seafood, eggs, dairy; plant foods have lower bioavailability as beans, nuts, grains

Bone Health & The Microbiome

- Gut bacteria improves absorption of calcium, iron, zinc, B-vitamins, selenium, etc. AND produce vitamin K2

Bone Health & Collagen

- Collagen helps maintain healthy hair, skin, bones and joints...also benefiting the intestinal wall!
- Specific collagen peptide supplementation improves bone mineral density; Can still benefit from bone broth

Bone Health & Protein

- Adequate protein provides the needed amino acids for building and maintaining bone tissue
- Protein stimulates the action of insulin-like growth factor1, which promotes bone growth and increases calcium absorption

The downside...

- The metabolism of protein, especially animal protein, increases body acidity which MAY be detrimental for bone health long term. Protein also increases urine calcium loss.

Acid-Base Balance & Bone Health

- High protein foods and cereal products increase body acidity
- Fruits and vegetable metabolism is more alkaline
- Acid-base profile of vegans vs. omnivores with moderate protein intake had NO significant difference in bone density
- Take home: protein in moderation offers more benefits than bad when combined with enough dietary calcium, emphasizing larger servings of fruits/vegetables over cereal grains

Lifestyle factors & other considerations

- Exercise for normal bone density:
 - Lifting heavier weights, high impact aerobics, running, jogging, jumping rope, hiking, climbing stairs, etc.
- Exercise for Osteoporosis (seek trainers specialized in area):
 - Holding safe poses instead of aerobics or fast movement (helps balance and muscle/bone strength); Hiking, walking, stairs ok for most (preferred over run/jog)
 - Avoid excessive bending, twisting movements, high-impact (jumps, heavy weights)
- Factors that may increase risk: Smoking, Alcohol, Caffeine, Medications (esp. Glucocorticosteroids), Antacids, PPI's
- Genetics & Body Weight that increase risk: family history, early menopause, BMI <21
- Other Considerations: Hormone Therapy, Bone building medications, Meditation