

Key Supplements & Minerals For Optimal Bone Health

Below are the key supplements and minerals that support bone growth. We recommend you include these in your diet and supplement as needed. You can click on each item below for more in depth information on it and how to include it in your diet.

Supplement/Mineral	Food Sources
<u>Ostinol</u>	NA
<u>Collagen Peptides/Amino Acids</u>	<i>Bone broth, fish, poultry, meat, eggs, dairy, legumes, and soy</i>
<u>Calcium aKG</u>	<i>Animal items like meat, fish, and dairy are natural sources of AKG</i>
<u>Turmeric Curcumin</u>	<i>Turmeric is a common spice and polyphenol that can be used in tea, curry, soup, golden milk, smoothies and rice</i>
<u>Phosphorus</u>	<i>Protein-rich foods: Meats, poultry, fish, eggs, dairy products, nuts, and legumes; Grain products: Bread, tortillas, brown rice, and oatmeal; Vegetables: Potatoes, asparagus, tomatoes, and cauliflower</i>
<u>Zinc *</u>	<i>Oysters, grapefruit, nuts, beans, kiwi, corn, and potatoes</i>
<u>Magnesium Glycinate</u>	<i>Fruits (bananas, dried apricots, avocados), nuts (almonds, cashews), legumes, whole grains, milk.</i>
<u>Vitamin D3</u>	<i>Salmon, herring and sardines, cod liver oil, canned tuna, egg yolks, mushrooms, vitamin D-fortified foods</i>
<u>Vitamin K2</u>	<i>Usually as MK-4 (pastured eggs, grass fed butter/meat/cheeses) or MK-7 (fermented soybean)</i>
<u>Copper</u>	<i>Liver, oysters, spirulina, mushrooms</i>
<u>Selenium</u>	<i>Brazil nuts, bananas, eggs and tuna</i>
<u>Boron</u>	<i>Prunes, raisins, and dried apricots, whole fruits, vegetables, nuts, avocados, almonds, cashews, dates, peanuts, lentils.</i>
<u>Manganese</u>	<i>Turmeric, grains, legumes, and tea</i>
<u>Silicon</u>	<i>Grains, especially oats, barley and some rice fractions</i>
<u>Isoflavones</u>	<i>Soybeans (most concentrated), legumes, grains, vegetables</i>
<u>Protein/Amino Acids</u>	<i>Red meat, chicken, fish, seafood, eggs, milk, cheese, yogurt, quinoa, chia seeds, tofu</i>

OSTEOSTRONG®

Ostinol®

Ostinol® Advanced 450, 300, 150

The bone morphogenic proteins (BMP) in Ostinol® naturally stimulate cells to grow bone tissue so calcium can bind to it. Ostinol® is the only product which contains these proteins that are proven to activate stem cells which build bone tissue – a natural process known as osteoinduction. Then calcium can bind to the tissue to make strong, healthy bones.

Ostinol® works with your favorite calcium or bone product to address both parts of bone loss – the mineral (calcium) loss and the tissue loss. Only Ostinol® contains a biologically active protein complex proven for 40 years and used clinically for 20 years to grow bone.

- **Ostinol® Advanced 150** – Mild joint dysfunction. Single joint. Prevention for bone loss of very slight decrease in bones loss (still normal T-score).
- **Ostinol® Advanced 300** – Mild/Moderate joint dysfunction. Weight bearing joints. Moderate bone loss. -1.1 to -2.4 T-score
- **Ostinol® Advanced 450** – Severe joint dysfunction/Bone loss. -2.5 or greater T-score

Ostinol® Advanced 5X

Ostinol® is the only product which contains these particular bone morphogenic proteins that are proven to activate stem cells which make cartilage – a natural process known as osteoinduction. These cells absorb glucosamine and chondroitin to form cartilage, building strong, healthy joints. Once the new tissue begins to grow, it can absorb important nutrients (e.g., Glucosamine, Chondroitin, MSM, SAmE, HA) that are necessary for the continued maintenance of strong joint cartilage.

AprèsFlex® is an innovative Boswellia serrata extract that enhances the bioavailability of boswellic acids through a proprietary method. The effectiveness of this specialized extract is backed by rigorous scientific studies that shine a light on how this plant extract works within the body to **protect the health of the joints, connective tissue, cartilage, and other tissues throughout the body**. One study even found that AprèsFlex® significantly reduced joint discomfort in as few as five days. It is also noted to improve gut and respiratory health as well.

Collagen Peptides

Collagen is a protein the body produces. It is an essential part of many bodily processes and bone mass. As people age, the body's ability to produce collagen decreases by around 1% to 1.5% per year. Collagen peptides are a type of animal collagen broken down into a more digestible form found in good quality bone broth and gelatins.

- aid in increasing bone mineral density and improving bone markers
- positively affect cartilage, tendons, and ligaments, as the peptides may stimulate the production of elastin and certain collagen types.
- Improve skin elasticity for reduction of fine lines and wrinkles
- Improve gut and brain health

A randomized trial reported on November 25, 2021 in the [Journal of Clinical Densitometry](#) found that the addition of collagen peptides to a standard bone-supporting regimen of calcium and vitamin D3 was

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associated with greater improvements in measures of bone health compared to calcium and vitamin D3 alone.

Food sources: bone broth, fish, poultry, meat, eggs, dairy, legumes, and soy

Calcium aKG

Calcium is a vital mineral for bone strength, and Ca-AKG makes it easier for our bodies to absorb this important nutrient. Research has shown that taking Ca-AKG supplements can be particularly beneficial for preventing and managing weak bones as well as reduce frailty (vision, hair color change, balance, grip strength, inflammatory markers). Individuals looking to improve markers of longevity and reverse biological age may benefit from adding calcium AKG to their longevity protocol.

Calcium alpha-ketoglutarate is a combination of calcium and the naturally occurring compound alpha-ketoglutarate. AKG participates in energy production and is involved in protein synthesis and breakdown to maintain muscle, collagen, tendons and ligaments. It is noted to decline starting at age 40 and is believed to increase energy, lower muscle fatigue, increase endurance, and aid in muscle regeneration after exercise. Further research is being done on its effects on cognitive decline.

Food sources: Animal items like meat, fish, and dairy are natural sources of AKG

Turmeric Curcumin

- Natural anti-inflammatory and antioxidant proven to aid in the relief of osteoarthritis metabolic syndrome, as well as other inflammatory conditions.
- Aid in the reduction of total cholesterol, LDL-C, and triglycerides.
- Prevent the growth of osteoclasts or cells that absorb old bones but it does not stop the formation of new bones.
- Improve memory due to reduction in brain inflammation

This amazing supplement is fermented which makes it more digestible/bioavailable and support gut function and also contains many other powerful organic herbs and superfoods promoting anti-inflammatory properties like *Boswellia serrata*, *ashwagandha*, *reishi mushroom*, and other natural liver/kidney cleansing products to provide overall wellness.

Food sources: Turmeric tea, curry, fresh turmeric added to soup, golden milk, smoothies and rice

Phosphorus

Phosphorus works with calcium to help build bones. You need the right amount of both calcium and phosphorus for bone health. Phosphorus also plays an important structural role in nucleic acids and cell membranes. It's involved in the body's energy production as well. Your body absorbs less phosphorus when calcium levels are too high, and vice versa. You also need vitamin D to absorb phosphorus properly. Phosphorus is important for building healthy bones and teeth. However, high phosphorus levels can cause damage to your body. Extra phosphorus causes body changes that pull calcium out of your bones, making them weak. Insufficient phosphorus along with low levels of calcium and vitamin D can lead to weaker, softer bones over long periods of time. Phosphorus levels are tightly controlled in your body.

Food sources: Protein-rich foods: Meats, poultry, fish, eggs, dairy products, nuts, and legumes; Grain products: Bread, tortillas, brown rice, and oatmeal; Vegetables: Potatoes, asparagus, tomatoes, and cauliflower

Zinc

- Stimulant for bone development by upregulating osteoblasts (cells that build bone) and downregulating osteoclasts (cells that break down bone)
- Enhance immune function
- Regulates hormones (cortisol, estrogen, progesterone, testosterone)
 - Improve moods
 - Relieves vaginal dryness
 - Regulates menstrual cycles
 - Prevent weight gain
- Reduces inflammation
- Helps maintain collagen and tissue health

Food sources: oysters, grapefruit, nuts, beans, kiwi, corn, and potatoes

Magnesium Glycinate

- Improved bone formation by affecting the concentration of vitamin D and calcium as well as osteoblastic and osteoclastic activity.
- Reduces muscle spasms and cramps
- Improves sleep - increases sleep time, sleep efficiency, and concentrations of renin and melatonin
- Neurotransmitter functions involved in mood stabilization
- Help controlling blood sugar among those with diabetes/insulin resistance
- Improved athletic performance and recovery from workouts
- Blood pressure regulation

Food sources: Fruits (bananas, dried apricots, avocados), nuts (almonds, cashews), legumes, whole grains, milk.

Vitamin D3 - takes Ca⁺ out of the intestines and aid in absorption into the bone

Vitamin D is a fat-soluble vitamin and considered a hormone that helps our bodies to absorb calcium and phosphorus in the gut and sends it to the bloodstream which is needed for bone remodeling. Not having enough vitamin D can weaken bones and make them brittle. Everyone's vit D requirements differ therefore we highly recommend having them tested.

Food sources: Salmon, herring and sardines, cod liver oil, canned tuna, egg yolks, mushrooms, vitamin D-fortified foods

Vitamin K2 - takes Ca⁺ out of the blood stream and aids in absorption into the bone

It comes in two forms typically:

- MK-7 (well absorbed) Prevents arterial calcification and may reverse existing calcification and restore flexibility and elasticity to vessels. It allows for free-floating calcium in the blood to be taken to the bone for bone building, thus reducing the risk of cardiovascular disease. Daily dose of anywhere from 75 – 375 mcg.

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- MK-4 Several studies have shown improvement in bone density with doses of 45 mg daily.
- Caution use if on Warfarin

Food sources: Usually as MK-4 (pastured eggs, grass fed butter/meat/cheeses) or MK-7 (fermented soybean)

Copper

Copper is an essential trace mineral found throughout the body necessary for survival. It is found in all body tissues and plays a role in making red blood cells and maintaining nerve cells and the immune system.

It also helps the body form collagen and absorb iron, and plays a role in energy production. Copper may also act as an antioxidant, reducing free radicals that can damage cells and DNA. Severe copper deficiency is associated with lower bone mineral density and a higher risk of osteoporosis. More research is needed on how marginal copper deficiency may affect bone health, and how copper supplementation might help prevent and manage osteoporosis.

Food sources: liver, oysters, spirulina, mushrooms

Selenium

Animal studies have shown that selenium deprivation can retard growth and change bone metabolism. Selenium plays a powerful dual role when it comes to bone health. It both lessens the activation of osteoclasts (cells that break down bone), and supports the creation and activity of osteoblasts (your bone-building cells). Additionally, a meta-analysis of relevant studies found that higher dietary selenium intake is positively associated with bone mineral density (BMD) and inversely associated with osteoporosis. Patients with osteoporosis had lower serum selenium levels compared to healthy controls. High selenium intake was also associated with a lower risk of hip fracture. So, including selenium-rich foods in your diet can contribute to better bone health!

Food sources: Brazil nuts, bananas, eggs and tuna

Boron

Boron is a trace element that has been found to play a critical role in bone growth and maintenance. It affects the use of other nutrients needed for bone health, including calcium, magnesium, and vitamin D. Dried plums are one of the best dietary sources of boron. For example, one study in 48 postmenopausal women with low bone density found that consuming 4-6 dried plums per day resulted in significant bone density improvements over 6 months. Boron is not regularly found in multivitamin supplements. As a result, it may be easier to consume it through foods.

Food sources: prunes, raisins, and dried apricots, whole fruits, vegetables, nuts, avocados, almonds, cashews, dates, peanuts, lentils.

Manganese

Manganese plays a number of roles in the body, and its key roles are helping in the formation and maintenance of bones. It promotes the formation of osteoblasts and osteoclasts, and provides

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metabolites and signaling molecules involved in the regulation of the synthesis of cellular components. Manganese is essential for bone health, including bone development and maintenance. When combined with the nutrients calcium, zinc and copper, manganese supports bone mineral density, which is particularly important in older adults.

Food sources: turmeric, grains, legumes, and tea

Silicon

Silicon is an important trace mineral for human health, particularly in relation to bone health. In animal studies, silicon supplements have been shown to increase bone density and reduce fragility. Here's what we know:

1. Collagen Production and Connective Tissue Formation: Silicon stimulates collagen production and connective tissue formation.
2. Bone Health: Silicon appears to help trigger the deposition of calcium and phosphate in bone tissue. Early studies established a direct relationship between silicon content and bone formation. Additionally, increased intake of bioavailable silicon has been associated with higher bone mineral density

Food Sources: Grains, especially oats, barley and some rice fractions

Isoflavones

These are a class of antioxidants often referred to as phytoestrogens. They have a structure similar to that of the hormone estrogen and can attach to and activate estrogen receptors in your body which help to maintain bone health by regulating osteoblast and osteoclast functions

Food sources: Soybeans (most concentrated), legumes, grains, vegetables

Protein/Amino Acids

Adequate protein intake provides the amino acids used in building and maintaining bone tissue, as well as stimulating the action of insulin-like growth factor 1, which in turn promotes bone growth and increases calcium absorption.

Dietary protein intake plays a critical role at older age. Bone mineral density (BMD), an important determinant of bone strength, appears to be positively associated with dietary protein intakes - variation in protein intakes within the normal range accounts for 2–4% of BMD variance in adults. Seniors with decreased protein intake are also more vulnerable to muscle weakness, sarcopenia and frailty, all contributing to increased risk of falling.

Research is inconclusive on the amount of protein that is essential though at least aim for 1.0 to 1.2 grams/kg body weight daily. More or less may be needed depending on weight, age, activity level, genetics.

Food sources: red meat, chicken, fish, seafood, eggs, milk, cheese, yogurt, quinoa, chia seeds, tofu