

A person is shown from behind, sitting in a yoga pose on a beach. Their hands are clasped together and held high above their head. The background consists of a calm sea and a hazy, mountainous horizon under a soft, purple-tinged sky.

The Whole Health  
Guide To  
Bone Health

## Supplement Disclaimer

For all supplements mentioned in this document: These statements have not been evaluated by the FDA. These products are not intended to diagnose, treat, cure, or prevent any disease.

## Medical Disclaimer

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# Knowledge & Empowerment

## What You Need to Know

There are three stages of bone health.



Stage 1 is during the first 25 years of life when you build the strongest, most dense bones and minimize any actions that may compromise bone building.



Stage 2 is from 30 years of age to menopause for women or andropause for men, where the key is to take steps to avoid the breakdown of the foundational bone health you created.



Stage 3 is post menopause or andropause for men, which is generally over 50 years or age, where you support both bone maintenance and limit bone loss.

For most individuals the risk for osteoporosis is strongly influenced by hereditary factors such as a family history of a parent with a hip fracture. Importantly, that risk is worsened by lifestyle issues. Other individuals can have medical conditions that cause or put them at risk for osteoporosis, but again, lifestyle can further increase that risk. Osteoporosis is a chronic, progressive disease with the most significant outcome being a fracture. It affects millions of Americans, particularly women, and it is estimated that anywhere between 20%-50% of post-menopausal women are affected by low bone density (although not all have osteoporosis) [1].

Although osteoporosis is often thought to be a disease primarily affecting women, men also incur substantial bone loss due to aging and decreased hormone production. Over two million men have this disease and men are more likely to incur fractures related to osteoporosis than to get prostate cancer [1-3]. The most serious complication of osteoporosis is fracture, specifically fractures of the hip, which cause severe pain, disability, and increased mortality.

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The major causes of osteoporosis are hereditary, low body weight (<127 lb), being a current smoker, and/or being on steroid therapy (i.e., Prednisone) [4]. The list of additional risk factors is long and includes vitamin D deficiency, hyperthyroid, hyper-parathyroid, renal calcium leak, poor nutrition, low hormone production, excess alcohol, and lack of exercise. However, osteoporosis can often be prevented by taking simple steps to build and support bone density. However, it is frequently underdiagnosed and, therefore, often undertreated. For that reason, the most important first step is to:

Find out the status of your bone density and evaluate your current lifestyle and diet.

Maybe you are getting enough calcium in your diet, but not getting enough magnesium, vitamin D, zinc or other co-factors? Maybe you are exercising and eating well, but also smoke or drink too much alcohol? Only by undertaking a personal assessment of your bone density, current lifestyle, and nutritional status will you get a clear picture of where you are and what measures you need to take.

- A bone health assessment is often covered by insurance companies, can be carried out by your health professional, and includes a medical history, physical exam, and the gold standard - a bone mineral density test or DEXA scan. Standard guidelines for DEXA scans are the following:
  - All women 65 years and older
  - Postmenopausal women with medical causes of bone loss (i.e. steroid use, hyper-parathyroidism, malabsorption, immobilization)
  - Postmenopausal women over 50 years with additional risk factors (fracture - other than skull, less than 127 lb, history of hip fracture in a parent, current smoker, alcohol intake more than 2 units/day (1 unit: beer = 12 oz; wine = 4 oz; liquor = 1 oz).
  - Any postmenopausal woman who has had a fracture after menopause

More extensive evaluation of underlying causes and management may include urinary and serum calcium, vitamin D levels, hormone analyses including parathyroid and thyroid tests, selected nutrient analysis, and a lifestyle, exercise, and nutritional assessment.

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# Hormones

## Key Messengers In The Body

All information in the body is transferred by two types of messengers — neurotransmitters and hormones.

Neurotransmitters help cells communicate through the nervous system, and hormones enable cells to communicate through the bloodstream. These two messengers control nearly every aspect of the body's function. They are so influential and at the root cause of so many health issues that your risk for many health conditions, like osteoporosis, are correlated to your hormone production. Within the first 3–5 years of a woman becoming post-menopausal (no menses in 12 months), they lose, on average, 7–10% of their bone density [5]. And yet, during those first 3–5 years, most women are eating the same foods, vitamins, and minerals, exercising the same way, and spending the same amount of time in the sun! The only real change is that the body's own production of hormones dramatically declines, which directly correlates to the initial loss of 7–10% of bone density at the beginning of menopause (if not on prescription hormones or bone density medications). Similarly, most men do not have bone health issues until later in life, when testosterone levels significantly decline.

This is the reason hormones are one of the most important aspects of bone health, particularly growth hormones, estrogen, progesterone, and testosterone. Additionally, often forgotten in bone health protocols is thyroid production, as hyperthyroidism or overproduction inhibits bone building and accelerates bone loss, increasing the risk for osteoporosis [6].

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- **Growth Hormone** — As boys and girls go through puberty the increased levels of hormones support bone growth. As its name implies, growth hormone is a key hormone in building both bone and muscle.
- **Estrogen** — Bone is a living tissue and scientists believe that, on average, people completely replace their bone once every ten years. This continual process of your body replacing old bone with new bone is conducted by cells called osteoclasts, which dissolve old bone, and osteoblast cells that build new bone. Estrogen is the hormone that controls the action of osteoclast cells, by preventing apoptosis - cellular death [7]. Therefore, increasing estrogen (estradiol specifically) may slow your bone loss. This is particularly important for post-menopausal women when estrogen dramatically declines.
- **Progesterone and Testosterone** — In the bone-rebuilding process, osteoblast cells are responsible for the building of new bone. Both progesterone and testosterone increase the activity of osteoblast cells, increasing the rate at which you build new bone [8,9]. Progesterone and testosterone have a less significant role in bone density and bone metabolism in women than estrogen, however, up to 53% of osteoporosis cases in men are related to low testosterone issues [10].
- **Thyroid Hormones** — When the thyroid gland is overactive, it can put us at risk for low bone mineral density. For those with hypothyroidism and on hormone replacement, it is important to make sure hormone levels (especially the TSH, but possibly the Free T4 and Free T3) are within a normal range. Too much circulating thyroid hormone, known as thyrotoxicosis, can cause bones to age faster [6].

Importantly, the increase in growth hormone and testosterone can also support muscle mass, which is critical for increasing strength and balance, helping to prevent falls. Muscle mass is actually the number one biomarker for aging, meaning that the more muscle you have, the healthier you are.

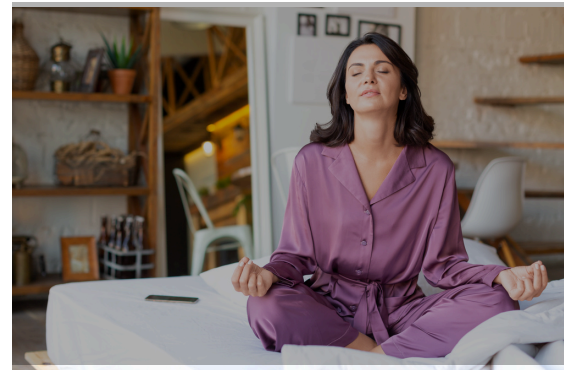
There are a number of steps you can take to improve your own hormonal status naturally:

- **Reduce Stress** — Whether physical or emotional, stress is known to disrupt most systems in our body, including our hormones and adrenal function. In response to stress the adrenals secrete cortisol. Chronic, elevated levels of cortisol in the bloodstream create the need for more hormones (e.g. thyroid, insulin, progesterone, testosterone) in order to do the same job. High cortisol levels that remain undiagnosed for years are a potentially significant contributor of osteoporosis because cortisol blocks the bone-building effects of progesterone [9].



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- **Meditation and Breathing** — Are great techniques to reduce stress. Taking even 15 minutes in the morning and before bed to practice therapeutic breathing and relaxation techniques will significantly reduce stress levels. Individuals who routinely practice meditation experience dramatic decreases in stress, mood stabilization, better sleep, and more energy. Research shows that these stress-reduction techniques benefit the immune and hormone-endocrine systems.



- **Eat Adequate Protein** — Protein makes up roughly 50% of the volume of bone and 33% of the mass [11]. The bone matrix (think scaffolding) is constantly being remodeled, and that involves protein breakdown and synthesis. Adequate daily protein is key, as too little protein can cause low bone density, while excessive protein consumption can increase the removal of calcium from the bones. Amino acids from protein are the building blocks of hormones. Vegetarian protein can be sourced from foods such as organic eggs, dairy products, tofu, quinoa, yogurt, nuts, whey, hemp or pea protein powders. Animal protein such as organic grass-fed red meat and chicken and wild fish can be used, but excess amounts can increase acidity and are high in phosphorus, which causes calcium to be excreted in the urine. Each meal should include a portion of protein the size of the palm of your hand and each snack a portion of protein about a third of that.



Minimum Protein Intake	0.5 gram per lb of body weight per day
Maximum Protein Intake	1.8 grams per lb of body weight per day
Athletes or Postmenopausal Women	1.0 — 1.8 grams per lb of body weight per day

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- **Drink Less Alcohol** — Chronic and heavy drinking disrupts the normal balance between bone formation by osteoblasts and the removal of old bone by osteoclasts. Alcohol has an adverse effect on osteoblast activity, thus suppressing new bone formation. The empty space created by normal bone-removing activity is inadequately filled by newly formed bone. Keep alcohol consumption to a minimum for health benefits and choose wisely: For women, the maximum alcohol intake should be no more than seven alcohol drinks per week.



- **Exercise** — Short, high intensity weight bearing exercise has been shown to increase the body's production of hormones in both men and women. More detail on the best strategy specifically for bone health can be found in the Exercise and Movement section.



- **Get a Massage** — Physical touch or massage is a key factor for maintaining hormonal health. Oxytocin, which stimulates growth hormone, is released during orgasm, labor, and breastfeeding, but also through safe touch, such as massage. Therefore, regular massage should not be seen as a luxury but rather as a health necessity! Additionally, sexual activity is important for many individuals to maintain the quality of life they desire.



- **Sleep** — Recharges the brain and allows the body to relax and heal. During sleep, the blood supply to the muscles is increased, which helps repair muscles while metabolic activity is at its lowest. Growth hormone peaks during deep sleep, which allows for tissue growth and repair. Proper immune response occurs during adequate and regular sleep. Proper, restful sleep is paramount since chronic insomnia and poor sleep can reduce testosterone levels by 40%. Additionally, melatonin may play an important role in not only supporting sleep, but bone health as well. Multiple studies have shown that adequate melatonin production impacts bone health positively, and supplementing with even low doses may slow bone loss in perimenopausal women [12].



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## Support Quality Sleep

There is a bidirectional relationship between bone health and sleep. For example, pain from a bone fracture will interfere with sleep duration, yet the lack of sleep will impair healing. Further, short sleep (<5 hours per night) has been associated with lower bone density and increased risk of fractures [12] (> 8 hours) also showed decreased bone density compared to those who slept 7–8 hours nightly [13].

Just like the circadian rhythm governs your sleep–wake cycle, there is a 24-hour rhythm that regulates the activity of bone remodeling, which is highly active at nighttime while you are sleeping. Lack of sleep can also increase the risk of falling [14].

Ensure you practice good sleep hygiene and get evaluated for sleep apnea if appropriate.

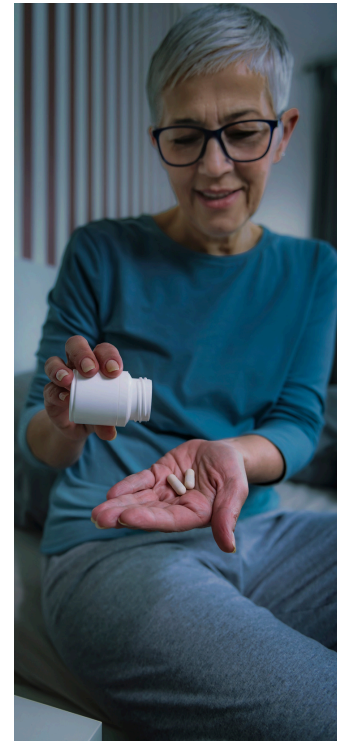
Aim for 7–8 hours of sleep nightly by establishing a regular bedtime, turning off electronics/screens at least 1 hour before bed, and calming yourself with some stress management techniques listed above.

When indicated, you may benefit from calming herbs such as chamomile, lavender, valerian, or lemon balm [15,16]. Further, L-theanine, found in green tea, can help promote relaxation and sleep [17].

One of the most known supplements to support sleep is melatonin [18]. The pineal gland, found in the brain, produces melatonin to induce sleep. Adults produce between 0.1 and 0.9 mg of melatonin daily, though this declines as we age and is higher in children and adolescents [18]. Consider Herbatonin 0.3 mg 30–60 minutes before bed if sleep support is needed. One study reported that Herbatonin was superior to synthetic melatonin, which is the most common supplementation form on the market [19].

Aside from sleep, studies have found melatonin to provide several benefits for bone health, including increasing bone formation activity and reducing bone resorption activity, resulting in increased bone density [14].

Be sure to check with your healthcare provider before starting any sleep support supplements, as there may be some contraindications. Additionally, “more is not always better” when using some of the supplement options mentioned above; therefore, guidance should be provided on choosing the right dose.

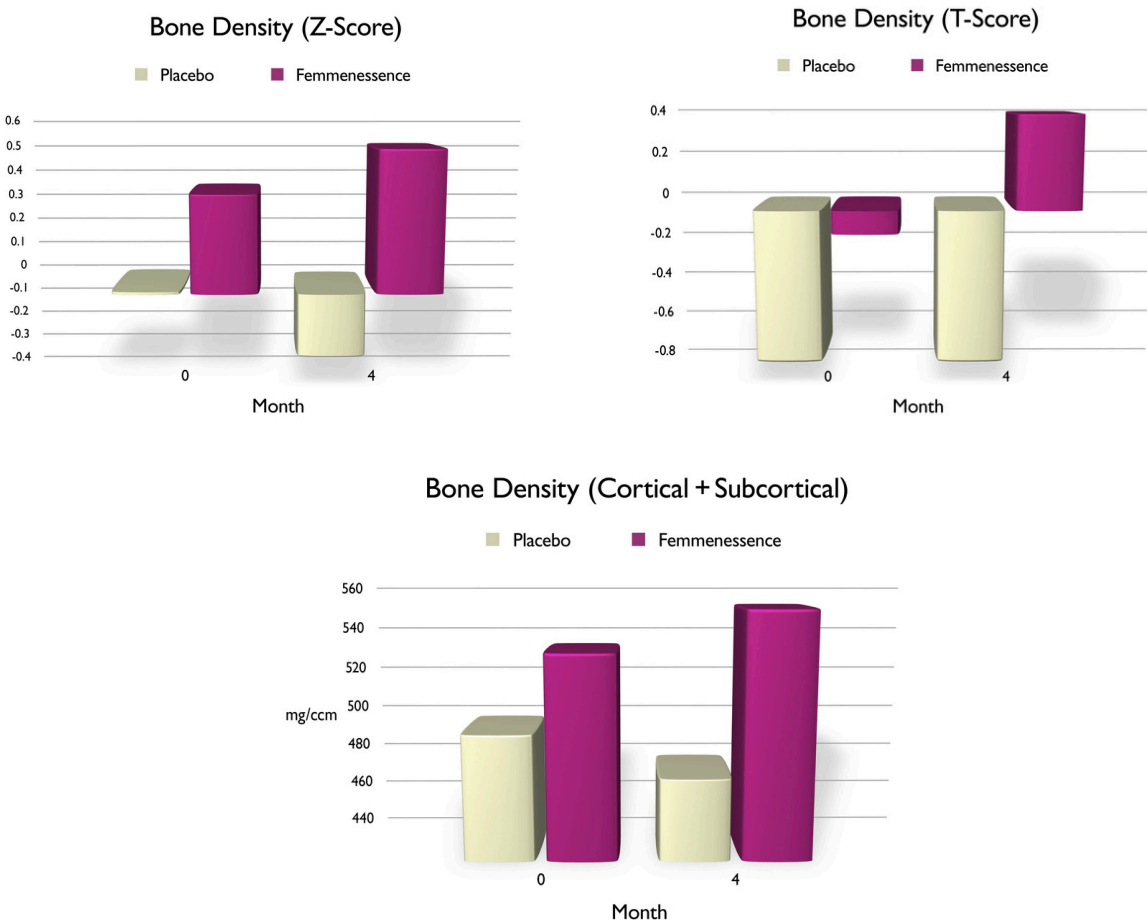


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# Hormone Therapies & Herbal Alternatives

Historically, doctors have used Hormone Replacement Therapy (HRT), or more recently Bio-Identical Hormones, all of which have clearly demonstrated bone density improvements when used in adequate doses and duration [20]. In order to receive long-term benefits of slowing bone loss and reducing the risk of fractures, hormone therapy of any kind would need to be taken long-term with aging. Once stopped, a woman will lose bone again. This has led many integrative practitioners to consider other alternatives. However, to date, there has been no clinical evidence on natural products showing statistically significant effects on the multiple hormones needed to impact bone health in post-menopausal women, although soy and red clover research does show a small benefit to bone density.

More recently, clinical research on a concentrated herbal preparation called Maca-GO® (commercially known as Femmenessence) has demonstrated, for the first time, statistically significant effects on post-menopausal women's own production of hormones, resulting in support of bone health and density [21-24].



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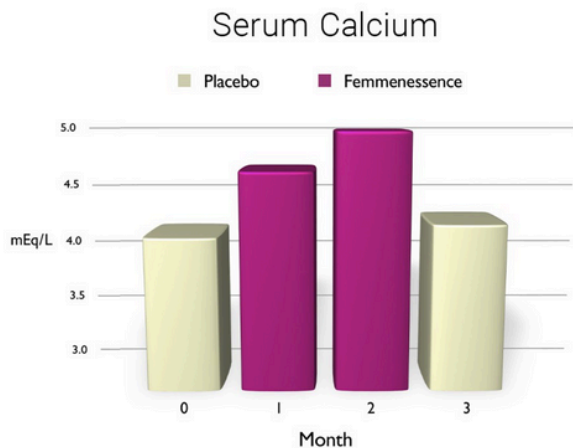
# Diet & Nutrition

## What You Need To Eat For Healthy Bones

Bone and muscle are living tissues. They grow, shrink and become stronger or weaker. A key factor in bone health (which includes bone density, bone strength and bone architecture) is to provide all the necessary elements for your bone. Bone is a complex, highly mineralized tissue, which requires essential nutrients for its formation. These include protein, fatty acids, calcium, magnesium and Vitamins A, D, E, K among others. Below are a few of the more important building blocks you need.

### Calcium

The first thing that usually comes to mind when people think of bone health is calcium. Calcium is essential for healthy bone formation; however, it requires the presence of optimal amounts of other trace minerals, vitamins and hormones to build bone and reduce risk of fracture. Also, research indicates that too much calcium (>1500 mg/day) can be associated with an increased risk of kidney stones and possible increased risk of cardiovascular disease, as well as the inhibition of absorption of smaller nutrients. A solution to the question of too much or too little calcium is to estimate dietary calcium and then supplement the difference. Most adults will consume between 400–700 mg of calcium from the foods they eat each day.



Femmenessence demonstrated an increase in serum calcium levels after just 2 months of use.

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Current recommendations for daily Intake are: [25]

1-3 years	500 mg/day
4-8 years	800 mg/day
9-24 years	1,200 mg/day
25-50 years	1,000 mg/day
Postmenopausal women	1,200-1,500 mg/day

Current research still reveals that the form or type of calcium is not an issue, if you take the calcium with food. For some, non-carbonate forms of calcium may be easier on the digestive system. Dairy products are the easiest form of calcium for most people to include in their diet. However, many have chosen to eat less dairy or perhaps none at all. Other food sources of calcium include sardines (with bones), sesame seeds, egg yolks, tofu, soybeans, molasses, and green leafy vegetables, all preferably organic. The best solution is to get adequate calcium in your diet from recommended food sources; however, it may also be necessary to choose a calcium supplement to fill the gap and ensure that you meet your daily requirements. Less constipating forms of calcium and perhaps easier on the digestive system, especially for those with reduced stomach acid, include non-carbonate forms such as calcium citrate, calcium lactate, calcium acetate or calcium gluconate.

One important aspect of bone health is gastrointestinal absorption: for dietary calcium and other minerals listed here to be absorbed into the body, good digestive function is paramount.

It is not uncommon for digestion to slow down as we get older, if you find that you have increased digestive concerns, from heartburn to bloating, gas, diarrhea or constipation reach out to your provider for help. Improving digestion through diet and supplementation will result in better absorption of all nutrients.

## Magnesium

Magnesium is an important cofactor in more than 300 enzymatic reactions in the human body and it is an important nutrient for bone mineralization [26]. Magnesium can help clear estrogen from the liver and balance the secretion of cortisol and progesterone. It is also calming and helpful for sleep or relieving muscle tension [27]. It promotes bone rebuilding and increases bone mass through the stimulation of parathyroid hormone, which enhances calcium metabolism. Magnesium is required to activate the enzymes involved in forming calcium crystals in bone and in converting Vitamin D to its active form [26].

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If supplementation is needed, magnesium is available in several different forms and doses. Forms include magnesium oxide, citrate, chloride, glycinate, and threonate. Too much magnesium can lead to loose stools or diarrhea; in fact, it is magnesium that is used on some over-the-counter laxatives.

Magnesium supplementation is often found in combination with calcium, which helps to reduce the constipating effects of calcium carbonate.

Supplementation options should be carefully explored and discussed with your healthcare provider.

Recommended Dietary Allowances (RDAs) for magnesium is: [28]

19-30 years (men)	400 mg/day
31+ years (men)	420 mg/day
19-30 years (women)	310 mg/day
31+ years (women)	320 mg/day

\*Amounts can vary during pregnancy and lactation

Select food sources: Pumpkin seeds, chia seeds, almonds, cashews, black beans, soymilk, edamame, and green leafy vegetables.

More details:

- **Magnesium oxide:** This form is poorly absorbed and will not support increasing magnesium levels in the body. It is most commonly used to calm digestive upset such as heartburn.
- **Citrate:** This form is easily absorbed in the body. It is one of the most common forms available in a supplement. It is known for its laxative effects, so caution should be used, especially for those with loose stools or may be helpful to relieve occasional constipation.
- **Chloride:** This form seems to be easily absorbed in the body, though it is most commonly found in lotions or creams to apply topically to soothe sore muscles, rather than increase magnesium levels.
- **Glycinate:** This form is also easily absorbed in the body and is also easily on the digestive tract, without promoting any laxative effects like some of the other forms.
- **Threonate:** This form is easily absorbed and the only form to cross the blood-brain barrier, making it a great choice for those who want to boost brain health.
- **Sulfate (added this one since it is epsom salts):** You may be familiar with form, which is also called Epsom salts and it is best and easily absorbed through the skin. Adding this to your bath can help relieve sore muscles. Of note, too much of this can create loose stools and/or relieve occasional constipation.

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Magnesium supplementation is often found in combination with calcium, which helps to reduce the constipating effects of calcium carbonate. Supplementation options should be carefully explored and discussed with your healthcare provider.

General (< 50 years)	500 mg/day or half the amount of calcium
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## Vitamin D

Vitamin D is actually defined as a pro-hormone and some doctors believe it's the most important supplement you can take. Vitamin D deficiency is often more of a concern than calcium deficiency in bone health. Vitamin D helps maintain serum calcium within a normal range, increases osteoblastic cell formation (bone-building cells), and enhances intestinal absorption of calcium [29]. Vitamin D is also essential for your immune system and overall health [30].

You can obtain Vitamin D three ways — from the sun, in small amounts from food, and through supplements. Ideally, the majority of Vitamin D formation occurs through sun exposure, 15 minutes of daily, unprotected sun exposure (ideally when UVB exposure is high from 10 am to 2 pm) is beneficial. Good sources of Vitamin D are naturally occurring in fatty fish (mackerel, salmon, and sardines) and fish liver oils, though many grain and dairy products are also fortified with Vitamin D. Current government guidelines recommend the following [30]:

General (< 50 years)	600 IU/day
Postmenopausal (> 51 years)	600-800 IU/day
Osteoporosis	800 IU+/day; specific amount based on individuals bone density, age, blood Vit D level, fracture history
Northern Latitude / Darker Skin	800-1000 IU/day; higher amounts in Fall & Winter

Many in the scientific and medical community now assert that these guidelines are outdated. More and more commonly, 1,000 IU and even up to 5,000 IU per day is recommended as routine, especially in the absence of sun exposure. Recent studies confirm that vitamin D blood levels below 30 ng/ml are associated with secondary hyperparathyroidism, immune dysfunction and increased bone turnover [31-32]. Those who test deficient in vitamin D will need higher amounts, at least until blood levels are increased to the suggested lab levels of over 50 ng/ml. Over 30 ng/ml is the necessary level for bone health [30].

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## Zinc, Copper, and Manganese

Zinc is essential for the formation of osteoblasts and osteoclasts, enhances the biochemical action of vitamin D, and is a key factor in the body's production of testosterone. Zinc is also necessary for the synthesis of various proteins found in bone and, therefore, is ideally consumed with protein. Zinc is found in grass-fed red meat, brewer's yeast, wheat germ, wild fish, organic chicken, and oysters. Zinc is kept in balance with copper, which is also important for proper bone development [33-34]. A deficiency of copper is known to produce below-normal bone development in growing children and may be a contributing cause of osteoporosis. In vitro studies have shown that copper supplementation inhibits bone resorption [33]. Foods high in copper include oysters, liver, nuts, chocolate, shellfish, and most seeds. Manganese deficiency causes a reduction of calcium deposition in bone. Manganese also stimulates mucopolysaccharide production, which provides a framework for the calcification process [35]. Foods high in manganese include organic raspberries, pineapples, whole grains, pecans, beans, tomatoes, and green leafy vegetables. Recommended intakes are: [30-35]

Zinc	15 mg/day
Copper	2 mg/day
Manganese	2 mg/day

## Vitamin K

Vitamin K is probably most known for its primary role in the manufacturing of clotting factors. In bone health, Vitamin K is responsible for converting a bone protein, osteocalcin, from its inactive form to its active form. Osteocalcin provides the protein matrix for mineralization and is thought to act as a regulator of bone mineralization. Vitamin K plays a key role in the formation, remodeling and repair of bone, by attracting calcium to the site of this protein matrix [36]. Deficiencies are not common, but can be found in individuals with chronic gastrointestinal disorders, poor fat absorption and in some individuals who have taken high or long-term doses of antibiotics.

Vitamin K, in fat-soluble chlorophyll form, is found in liver, soybeans, kelp, cabbage and broccoli. Monounsaturated fats found in olive oil and canola oil are also naturally high in Vitamin K. While the recommended dietary intake of vitamin K is 90-120 mcg per day, the optimal dose and form of vitamin K supplementation to achieve a protective effect on bone loss and fracture reduction is not known

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# Vitamin B-12

Vitamin B-12 has numerous health benefits, especially related to heart, nerve, and brain health. Many often forget about Vitamin B-12's role in bone health, but it has been shown to help osteoblast (bone-building cell) function and promote the re-methylation of homocysteine to methionine, as well as reducing homocysteine levels directly [37]. Homocysteine has the potential to promote osteoporosis if it is not eliminated adequately. Vitamin B-12 is normally found in grass-fed red meat, shellfish, liver, fish, cheese, spirulina, and sea kelp. Sublingual tablets or liquids are often best absorbed and come in cyanocobalamin or methylcobalamin forms [37]. Daily recommended intake is: [37]

Vitamin B-12	500 - 5000 mcg/day
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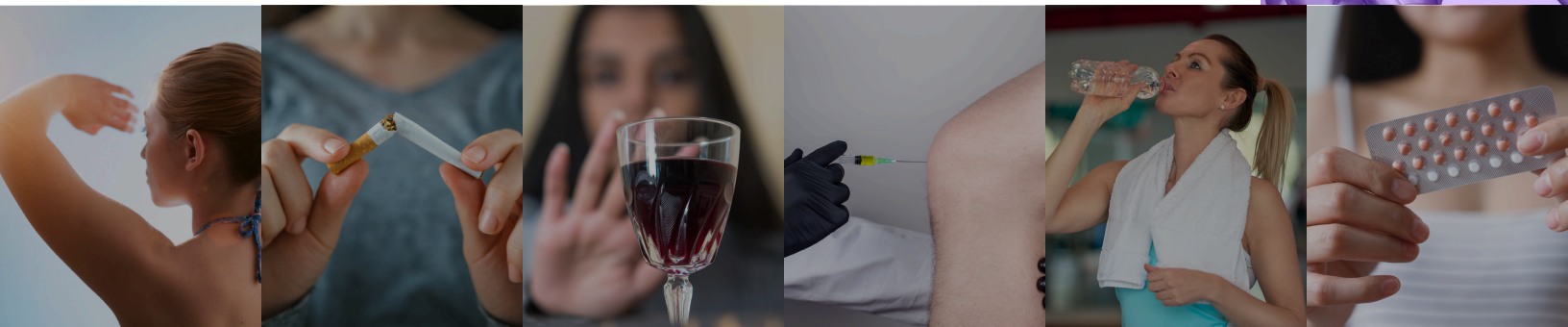


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# Lifestyle & Environment

## Day To Day Choices You Can Make For Optimal Bone Health

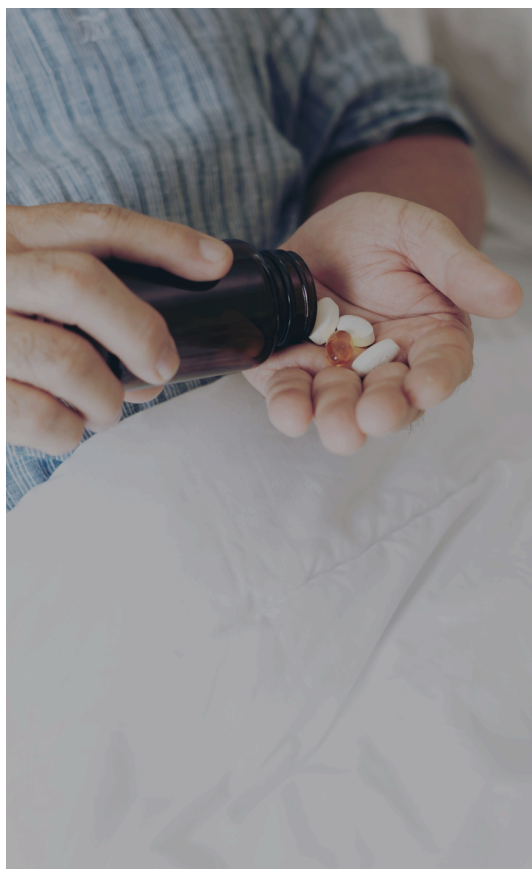
- Low exposure to the sun or excessive use of sunblock can reduce Vitamin D synthesis in the skin.
- Smoking decreases estradiol, can lead to early menopause, reduces key antioxidants, and decreases the body's ability to heal [38].
- Excess consumption of alcohol affects the production of hormones, vitamin status, and can increase the risk of falls [39].
- Corticosteroid use affects bone remodeling by interfering with osteoclastic and osteoblastic cell formation [40].
- Distilled water, which is low in mineral content, can lead to mineral deficiencies that can adversely affect bone health.
- Hormone medications/the pill: Like all medications, there are pros and cons of menopause hormone therapies and hormonal contraception, which can come in a variety of forms. The information that follows just relates to the pros and cons of bone health. Menopausal hormone therapies, or the birth control pill, that include just estrogen or both estrogen and progestogen can be a positive for bone density, especially if you are prematurely menopausal or have a condition called hypothalamic amenorrhea [40].



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- In fact, insufficient levels of estrogen/progesterone for these two conditions can actually dramatically increase one's risk of osteoporosis. On the other hand, progestin-only birth control, such as the Depo-Provera shot form, can be a negative for healthy bone density in young women and can increase the risk of osteoporosis, as well as alter select nutrients in the body [41]. What hormones, at what age, for what conditions and the benefits versus risk is a complicated medical arena, requiring an individualized approach. Find a clinician who is truly well-educated in women's health and provides you with hormone and non-hormone options.
- **Pharmaceuticals** such as anticoagulants, anticonvulsants, anti-anxiety medications, aromatase inhibitors, steroids, diuretics, immunosuppressant drugs, and antacids have all been seen to reduce bone density [40]. Proton pump inhibitor drugs, used to treat GERD and reduce stomach acid, may also have a negative impact on bone health and integrity with long-term usage [40].

Many foods are considered acid-producing foods, which can promote the loss of calcium and should be carefully monitored to ensure balance is maintained. The Standard American diet, which is typically high in phosphorus (meat, processed foods, junk food, and sugar), creates a more acidic state and can result in decreased calcium levels in the body.



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Reducing foods that increase calcium loss should be minimized, while those foods that act to lower acid, or alkalize, the body should be increased.

- **Red meat** (acidic) is high in phosphorus, causing calcium to be excreted in the urine.
- **Refined sugar** (acidic) requires alkalizing minerals such as calcium and magnesium for its absorption, thus reducing their availability for bone health.
- **White Flour** (acidic) found in breads, pasta and pastries.
- **Salt** due to its poor structure and often added chemicals, puts unnecessary strain on the body and its function. Alternatively, Original Himalayan Crystal Salt contains 84 trace minerals (including calcium) and the perfect structure to alkalize the body.
- **Foods/beverages** such as soda, coffee, tea, dairy and chocolate are high in phosphoric acid and can leach out available calcium and magnesium from the body, if used in excess.
- **Alkalizing foods** such as green, leafy vegetables should be eaten liberally to support pH balance. Supplementation is encouraged especially if you need to compliment your diet.

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# Lifestyle & Environment

## Mental and Emotional Considerations for Bone Health

Psychological stress and stress-related disorders, such as anxiety and depression, negatively impact bone health. Studies have shown that anxiety can contribute to lower hip bone mineral density and depression is a predictive factor for fracture development [42]. While the mechanism of how stress impacts bone health is not fully understood, researchers believe that hormone signaling that occurs through the brain-immune system when under stress contributes to greater inflammation and bone loss [42]. Additionally, hormones and neurotransmitters, such as estrogen and serotonin, are impacted when stressed and can negatively impact the cells that build new bone [42]. Further, high cortisol levels that remain elevated for extended periods of time (months to years) are a potentially significant contributor to decreased bone density because cortisol blocks the bone-building effects of progesterone [9].

Acute and chronic stress can also impair sleep by reducing melatonin production. Melatonin, often thought of as the sleep hormone, provides several benefits for bone health, including increasing bone formation activity and reducing bone resorption activity, resulting in increased bone density [12]. As with all hormones, melatonin production naturally declines within the body from 0.3-0.5 mg during our 20s, 30s, and early 40s to around, on average, 0.1 mg by 55 years of age, which is why many practitioners include a low physiological dose of 0.3 mg of melatonin to protocols for patients over 50 years to support normal brain and bone health [18].

Practicing various forms of stress management and ensuring adequate sleep can help reduce stress and improve bone health.



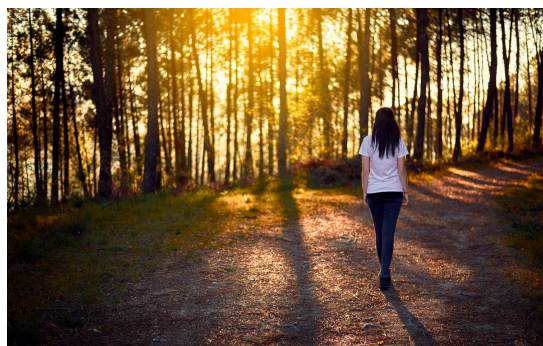
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# Lifestyle & Environment

## You can reduce stress and its effects by:

- Coloring, journaling, or completing puzzles
- Doodling or drawing
- Engaging in meditation, guided imagery, prayer, or breathwork
- Getting a massage
- Listening to soothing music
- Playing with pets
- Practicing yoga
- Reading a fiction book
- Sipping on some tea and relaxing.
- Soaking in a bath with bath salts and calming essential oils, like lavender.
- Taking intentional “pauses”. This can be a time for doing something creative or just simply ‘being.’
- Walking in nature (“forest bathing”)
- Watching a comedy

Like exercise, find something you enjoy doing and make time for it.



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# Lifestyle & Environment

## Energetic Considerations for Bone Health

In Traditional Chinese Medicine, bone health is controlled by the energy or essence of the kidney meridian. This should not be confused with the kidney as an organ but rather the energetic pathway that regulates skeletal health as well as the reproductive system. This is commonly referred to as kidney Qi (pronounced 'chee') [43]. It is reported that women's kidney Qi becomes deficient when menstruation stops and hormones, like estrogen, decline [43]. Some studies suggest that women with a deficiency in kidney Qi have a higher incidence of bone conditions, increased loss of bone mass, weakened bones, and may experience bone soreness [43,44]. Traditional Chinese Medicine (TCM) practices can be described as the "integration of body and spirit." Provide energetic support to bone health by improving your kidney Qi through TCM practices such as acupuncture [44].

In addition, both TCM and energy practitioners have reported that Femmenessence can balance hormones and meridians. How this happens, we are unsure; however, what we do know is that Femmenessence impacts the entire endocrine system, which correlates to each of the meridian centers.



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# Exercise & Movement

## How To Exercise For The Best Bone Density Results

There is well-established evidence that physical activity early in life contributes to higher peak bone mass, with resistance training and high-impact exercise being the most beneficial [45]. Exercise during the middle years of life has numerous health benefits, but there are few studies on the effects of exercise on bone density. Regular exercise later in life, in the presence of adequate calcium and vitamin D intake, has shown a modest effect on slowing the decline in bone density [46].

Bone building occurs in two stages: remodeling and resorption. When you have healthy, dense bones, these two processes occur together all the time. Where it becomes problematic is when there is an imbalance between the two stages. Weight-bearing exercise puts direct force on the muscles, which then stresses the bone and activates a gene that makes a protein responsible for turning on osteoblasts to do the work of building bones [45]. If you already have osteoporosis, you must start very slowly with weight-bearing exercises and build up over time.

Bone loss is also related to muscle atrophy. Both bone and muscle are active tissues that strengthen and weaken based on the weight, tension, or stress under which they are placed. As an example, individuals confined to bed will experience atrophy (decrease in size and strength) of muscles and bones. Conversely, weight-bearing activities, such as high-impact exercise, will cause muscles and bones to increase in size, strength, and structure. However, it is important to point out that overtraining with physical exercise can result in injury and have a negative impact on bone health. Additionally, overtraining or physical stress, even emotional stress, can result in elevated cortisol levels for extended periods of time, which can accelerate bone loss. Exercise programs should be balanced with type, intensity, and, more importantly, consistency. Statistics confirm that people who are more active have denser bones and fewer fractures in old age. Exercise also decreases the risk of fracture by improving muscle strength and balance [45].

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Maintaining a healthy weight is also critically important. Ideally, the average woman's body mass index (BMI) should be between 19 and 25. Weighing less than 127 lbs., however, potentially increases the risk for osteoporosis; but, if you are of short stature and a healthy body weight is indeed less than 127 pounds, the goal is not to be overweight... it's just that women who weigh under 127 pounds have lower bone density and, therefore, may need more attention to healthy bone aging. Therefore, optimal results require planning and sometimes require help:

- **The first step** is to find a training partner, class you like or an activity that is emotionally stimulating. It has been shown that people exercise more consistently when doing so with others and choosing exercise programs that are fun and engaging.
- **Second**, consider getting a personal trainer who has experience in bone density. Professional direction will ensure you are doing things correctly, safely and effectively.
- **Third**, find activities that are weight bearing, such as lifting weights, yoga, hiking, running, brisk walking, Pilates, tai chi or dancing. Rebounding (small trampolines) has gained popularity as the ultimate low-impact fat-burning and bone building exercise.
- **Fourth**, dedicate time to exercise each week, ensuring it is effective and focused on achieving results. Set goals, be consistent and sweat! To gain the protective benefits from exercise, it is recommended you do a minimum of 3 sessions a week for at least an hour or 6 sessions lasting 30 minutes each. Also, be aware that when you train properly you will sweat and when you train consistently you will see and feel results within a matter of months.
- **Finally**, just do it! The moment you stop to think about what else you could do, how hard it will be, or if you have time (come up with an excuse!), is the moment you won't do it. 99% of the time you exercise, you will not turn around afterwards and think, "I shouldn't have done that." Rather you will say, "I am so glad I did that!"



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# Summary

## Bone Health Recommendations

### Empowerment & Knowledge

- Bone mineral density test
- Urinary and serum calcium level, urine or serum N-telopeptide level, Vitamin D level
- Estrogen, progesterone, testosterone, parathyroid and thyroid tests
- Measure height annually after menopause, normal age-related height loss is 1.0"-1.5"
- Lifestyle, exercise and nutritional analysis by a professional

### Hormone Balance

- Estrogen
- Progesterone
- Testosterone
- Thyroid/Adrenals
- Femmenessence to support healthy hormone levels
- Herbatonin 0.3 – 3mg to support sleep and bone health

### Diet & Nutrition

Vitamin / Mineral	Amount per day	Source
Calcium	500 - 1200 mg	Organic green leafy vegetables, sardines, molasses, dairy, supplementation
Magnesium	500 mg	Organic green leafy vegetables, wheat bran, brewer's yeast, supplementation

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Zinc	15 mg	Oysters, grass-fed red meat, organic chicken, fish, wheat germ, supplementation
Copper	2 mg	Liver, oysters, nuts, chocolate, seeds, shellfish, supplementation
Manganese	2 mg	Pineapple, raspberries, beans, tomatoes, green leafy vegetables, supplementation
Vitamin D	1000 - 2000 IU	15-20 minutes of sun, wild fish — sardines, mackerel, and salmon, supplementation
Vitamin K	90 - 120 mcg	Chlorophyll, broccoli, cabbage, kelp, olive oil, supplementation
Vitamin B12	400 - 800 mcg	Grass-fed red meat, shellfish, liver, cheese, spirulina, kelp, supplementation

## Lifestyle & Environment

- Don't smoke
- Reduce stress
- Meditate and sleep more
- Eat more protein and green leafy vegetables
- Walk in the sun 15 to 20 minutes a day
- Mineralize your water with Original Himalayan Crystal Salt sole therapy
- Keep alcohol consumption to no greater than one drink per day of wine/beer
- Avoid soda pop, reduce coffee and tea
- Reduce consumption of processed foods, refined flour and refined sugar
- Minimize corticosteroids and pharmaceuticals
- Supplement with pH Quintessence, 3 capsules per day

## Exercise & Movement

- Maintain healthy body weight, BMI and body fat percentage.
- Get a personal trainer
- Commit to regular exercise and weight bearing exercise three days per week
- Get a massage once a week

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## A Guide To Bone Health

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