

Osteoporosis

Disease Report

REPORT CATEGORIES —



LONGEVITY



BONE HEALTH

Sample Client

Report date: 15 January 2026

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DISCLAIMER

This report does not diagnose this or any other health conditions. Please talk to a healthcare professional if this condition runs in your family, you think you might have this condition, or you have any concerns about your results.

Personal information

NAME

Sample Client

SEX AT BIRTH

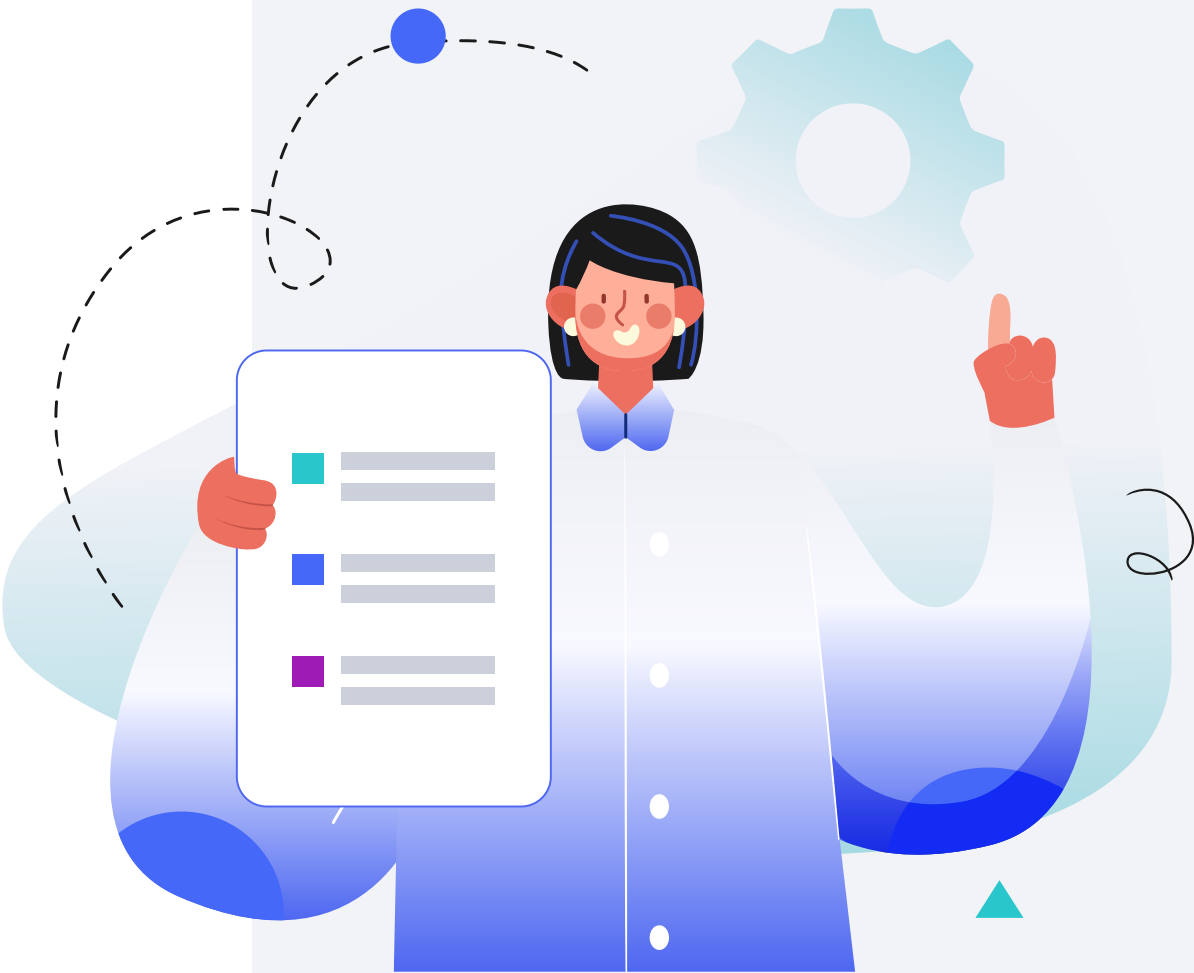
Male

HEIGHT

5ft 5" 165cm

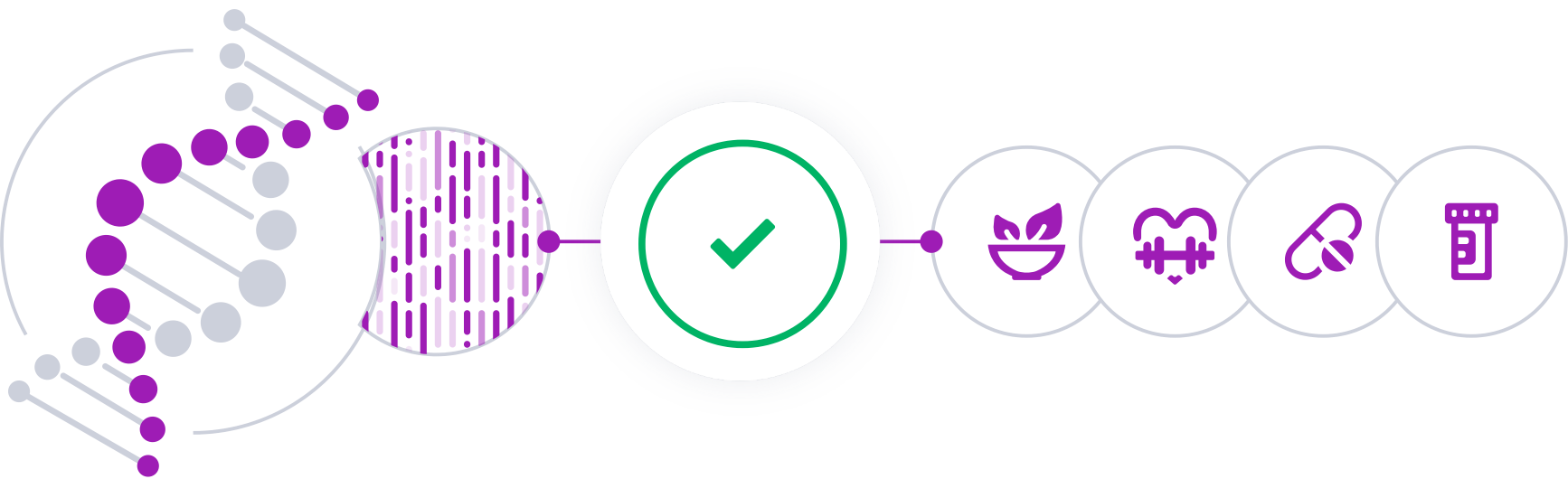
WEIGHT

137lb 62kg



How this works

Our Wellness Reports analyze how your DNA influences your health.
We then use this analysis to give you personalized risk estimates and recommendations.

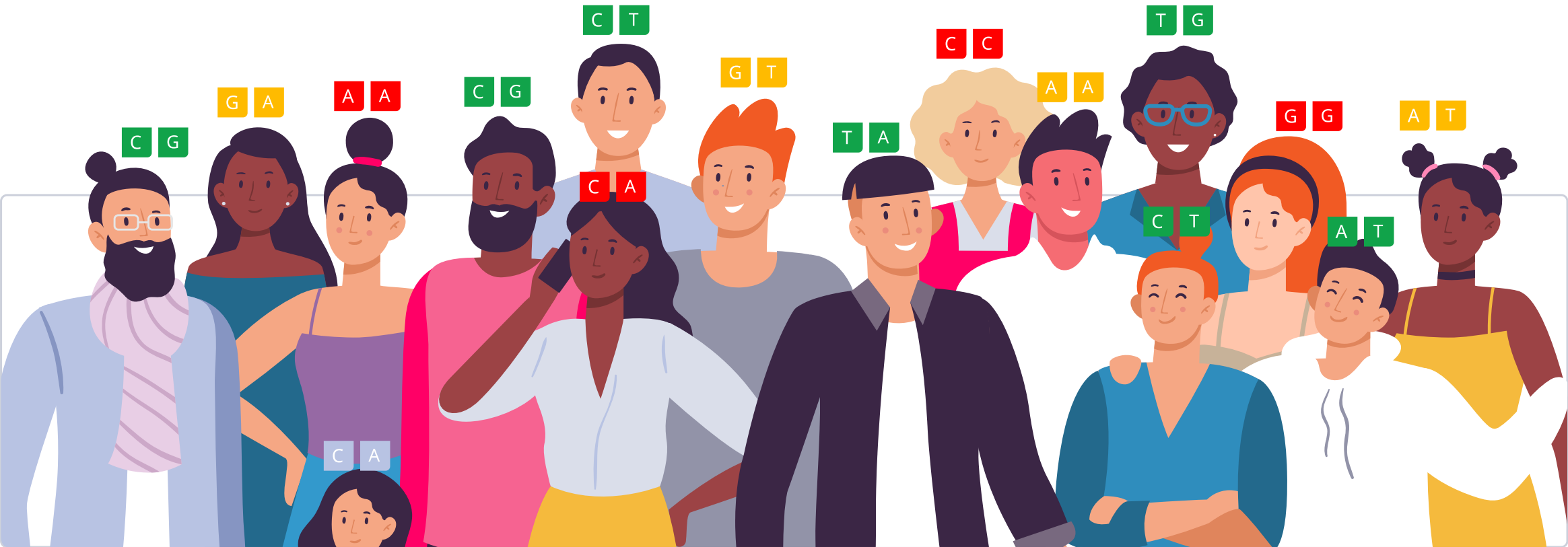


Similarly, our Trait Reports look at how your DNA influences your traits.



Your DNA is like an instruction manual — it contains a lot of information.
You can think of it as a blueprint for your body.

Genetic variants are parts of DNA that differ from person to person. Some can make you more vulnerable to certain health issues, while others may influence traits such as eye color.



We use artificial intelligence and machine learning to analyze all this information.
We then summarize your results as a risk score or display it on a gauge.

In total, we analyze up to 83 million genetic variants.

When we give a risk score, the risk icon tells you if you are at a higher or lower risk compared to other people:



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

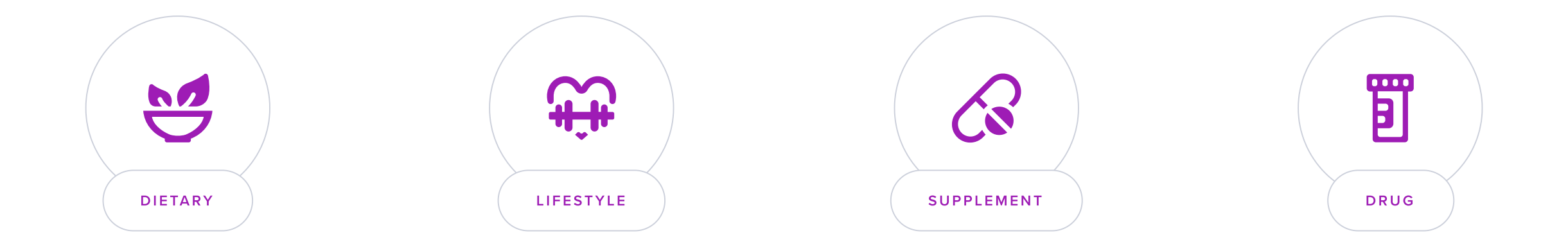
You have 2 risk alleles

Your risk is also displayed as a percentile. This will tell you how your risks compare to our sample population. The lower your percentile number, the lower your risk. The "50th percentile" would be an average risk.

Similarly, the gauge tells you your relative risk score compared to our sample population, or it indicates a specific trait or haplotype you are more likely to have based on your genetic variants.

When applicable, we also list top evidence-based recommendations that may help lower your risk. The focus is on recommendations that may be of benefit to you, based on your genetics.

Our recommendations come in four categories: lifestyle, diet, supplements and drugs.
The following icons tell you which category a recommendation falls into:



Our team of scientists also ranks each recommendation.
We rank based on impact and the strength of evidence in the medical literature.

Impact shows how strongly a recommendation will affect your health in a certain area.
Evidence is how much scientific support there is for the recommendation. Rankings are from 1 to 5 (low to high):



Impact

Impact scores range from 1-5. These scores reflect how much of an effect each recommendation can have. An impact score of 5 predicts the biggest effect.

When a recommendation affects something we can measure, we use those measurements to assign the impact score. For example, a recommendation that decreases cholesterol by 20% will have a higher impact score than one that decreases it by 5%.

Some recommendations affect things that we cannot directly measure, like stress or mood. For these, the impact score is based on how well they work relative to other recommendations and standard treatments. The best ones get the highest scores.

If there is a lot of research that shows a recommendation works especially well for your genotype, the impact score gets increased.

Recommendation Evidence

- 5 / 5
- Recommendations that are considered effective and generally recommended by experts and medical bodies.
-
- 4 / 5
- Recommendations that are considered likely effective and that have multiple independent meta-analyses and a great many studies supporting them.
-
- 3 / 5
- Recommendations that are considered possibly effective and have many studies supporting them
-
- 2 / 5
- Recommendations that have insufficient evidence, with two or several clinical trials supporting them, or many studies but with ambiguous results.
-
- 1 / 5
- Recommendations that have insufficient evidence, with a single clinical trial, or with many studies most of which didn't find support for the recommendation.
-
- 0 / 5
- No evidence in humans.

Genotype-specific Evidence

- High-quality
- Direct evidence that a recommendation helps more in people with your gene variant (many clinical trials, a few large clinical trials, or a meta-analysis).
- Medium-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a few clinical trials or one large clinical trial).
- Low-quality
- Direct evidence that a recommendation helps more in people with your gene variant (a single clinical trial or more trials with inconsistent results).
- Indirect
- A recommendation may help more in people with your gene variant because it targets a specific gene or protein affected by your variant (e.g., MTHFR, dopamine).
- In theory
- A recommendation may help more in people with your gene variant because it targets a specific mechanism affected by your variant (e.g., inflammation, oxidative stress).

Some things to keep in mind:

- Genetics doesn’t play a considerable role in a condition or a trait.
- There is not enough research available to estimate a genetic predisposition.
- There are technical limitations to estimating or presenting a genetic predisposition.
- The topic is sensitive, and a genetic predisposition should only be estimated and presented by a healthcare professional.

Introduction

We all know that ‘*the foot bone’s connected to the leg bone and the leg bone’s connected to the knee bone,*’ but how much do we actually know about our bone health?

Whether or not we’re taking good enough care of our bones is not a question we often ask ourselves. But **bones are as important as they are amazing.**

They support our entire body, help us move, and protect our vital organs. Our bones are also used for storing important minerals like phosphorus and calcium [R].

Interestingly, bones are alive, just like other parts of the body. Old bone is lost and replaced with new bone every day. Sub-optimal bone health can lead to more bone being lost than replaced, causing an overall reduction in bone density.

Poor bone health can affect anyone and lead to several different types of bone disease.

The most common bone disease is osteoporosis. Osteoporosis occurs when significant bone loss leads to weaker bones.

When it comes to making sure you have strong and healthy bones, there are a few general things you can do. This includes maintaining a healthy diet with plenty of calcium and vitamin D. Exercising is also important [R].

Some people may still suffer from poor bone health even if they get the average recommended amount of these bone health-boosting factors. This is because **we are all genetically unique.**

For example, carrying a particular variant of the [GC](#) gene may increase your risk of vitamin D deficiency relative to the average person. As a result, you may need to take particular care to get enough of this vital bone vitamin [R, R].

Alternatively, carrying a certain variant of the [LRP5](#) or [COL1A1](#) gene may increase your risk of developing weaker bones or even osteoporosis if you’re exposed to cigarette smoke [R, R].

These are just a few ways in which genes and bone health can interact. By understanding these mechanisms, you can target these interactions to potentially improve your bone health.

Read on to find out more about:

- **How your genetics play a role in osteoporosis**
- **Your genetic risk score based on over 71,000 genetic variants**
- **Personalized recommendations based on your genetics**

Longevity Screener

Longevity Screener analyzes your DNA and biometric data to holistically determine your risk of developing serious medical conditions.

Your lifetime risk is **Normal**

Your 10-year risk is **Normal**

Summary or results

Your results are indicating a Normal risk of developing Osteoporosis in your lifetime and within the next decade.

Monitor your risk by regularly checking your related labs and implementing the recommendations provided.

The risk of developing Osteoporosis can be influenced by non-genetic factors such as Crohn's disease, Ulcerative colitis, Rheumatoid arthritis, Celiac disease.

What to do if you get a High risk

Analyze your labs

Analyze your lab results to establish a baseline and track any changes or improvements in your health markers over time.

Find out your out-of-optimal labs

We will pinpoint any values that fall outside the optimal range, allowing you to focus on what matters most.

Optimize labs

Aim to bring all your lab results to optimal levels through lifestyle changes, treatments, and ongoing monitoring for the best health outcomes.

Disclaimer

The Longevity Screener feature is designed to provide insights based on genetic predispositions and basic health data to help you understand factors that may influence your longevity. This tool is for informational purposes only and does not constitute medical advice, diagnosis, or treatment. Always consult with a qualified healthcare provider before making any decisions related to your health, lifestyle, or medical treatments. The information provided by the Longevity Screener is based on current scientific research and should be used as a supplementary tool in conjunction with professional medical advice.

About Osteoporosis

Key Takeaways:

- Up to **65%** of differences in people's BMD may be attributed to genetics.
- Other risk factors for osteoporosis include: age, menopause, underweight, steroid use, smoking, and alcohol abuse.
- Over **200 million** people have osteoporosis. If your genetic risk is high or you are getting older, you may want to take precautions.
- Click the **Recommendations** tab for potential dietary and lifestyle changes and **next steps** for relevant labs.

Bone health is most often measured through **bone mineral density (BMD)**. This is the amount of calcium and other minerals in your bones [R, R, R].

Higher BMD tends to mean stronger, healthier bones. BMD peaks between the ages of 25 and 30 and then decreases as we age. Lower BMD for your age may put you at risk of fractures and *osteoporosis* [R, R].

Osteoporosis is a disease that develops when BMD is dangerously low. Its name means *porous bones*. As the name implies, the structure of the bones changes in people with this condition. Their bones lose mass and strength, leaving gaps and holes [R, R, R].

People with osteoporosis are much more likely to break their bones. They may even be at risk of fracture from doing normal day-to-day activities [R].

According to one estimate, **over 200 million people currently have osteoporosis. About 1 in 3 women and 1 in 5 men over 50 will break a bone due to this condition** [R].

Risk factors for weak bones include [R, R]:

- Older age
- Menopause



TYPICAL LIKELIHOOD

Typical likelihood of osteoporosis based on 1,031,189 genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MARCO	rs115242848	CC
COPB1	rs10741657	GG
CPNE1	rs143383	AA
COL1A1	rs1800012	AC
VDR	rs2228570	GA
HLA-DQA1	rs2071805	CC
VARs2	rs9262558	CC
SP7	rs144680237	CC
CPED1	rs3779381	AA
ZBTB40	rs34414754	AA
WLS	rs2566755	TT
CPED1	rs10242100	AA
VDR	rs1544410	CT
VDR	rs731236	AG
MRPL20	rs12408050	GA
FKBP11	rs3741619	GA
ETS2	rs11088458	AG
HBZ	rs10794639	GA
SMOC1	rs3742909	AG
HOXC6	rs7308105	TC
DIO2	rs225014	TT
MN1	rs139959245	CC
SPP1	rs33983260	DEL(AG)DEL(AG)
GAL	rs880610	GG

- Low body weight
- Steroid medications
- Cigarette smoking
- High alcohol intake
- **Genetics**

It's impossible to tell if you have low BMD without a doctor's help. This is because low BMD on its own doesn't have any obvious symptoms. Many people have no idea they have osteoporosis until they break a bone [R].

To support bone health and prevent fractures, your doctor may recommend [R]:

- Exercising
- Getting more calcium and vitamin D
- Avoiding cigarettes
- Limiting alcohol

Once osteoporosis is diagnosed, treatment may also include medication [R, R, R].

Up to 65% of differences in people's BMD may be attributed to genetics. Genes involved in BMD may influence [R, R, R]:

- Bone formation and repair ([DAAM2](#), [BICC1](#), [LGR4](#), [NPR3](#))
- Gene activity ([HMGA2](#))
- Vitamin D activity ([VDR](#))

Genetically high IGF-1, free testosterone (in men), and alpha-linolenic acid may be causally associated with higher bone density. In contrast, genetically high total testosterone may be causally associated with lower bone density and a higher risk of osteoporosis [R, R, R, R].

GENE	SNP	GENOTYPE
GAL	rs56154705	CC
CTNNB1	rs389264	CC
RSPO3	rs9482772	CC
CCDC170	rs4869744	TT

The number of "risk" variants in this table doesn't necessarily reflect your overall result.

Your Recommendations

Your recommendations are prioritized according to the likelihood of it having an impact for you based on your genetics, along with the amount of scientific evidence supporting the recommendation.

You’ll likely find common healthy recommendations at the top of the list because they are often the most impactful and most researched.

		DOSAGE			DOSAGE
1	Strength Training	1 hour	2	Exercise At Least One Hour a Day	1 hour
3	Dietary Calcium		4	Maintain Optimal Vitamin D Levels	1000 iu
5	Practice Exercise Snacks	1 minutesute	6	Calcium Supplements	1000 mg
7	Vitamin D and Calcium		8	Strontium Citrate	125 mg
9	Basketball	30 minutes	10	Soy	
11	Vitamin K2	100 mcg	12	Dairy Products	
13	Aerobic Exercise (Cardio)	1 hour	14	Dietary Vitamin C	
15	Soy Isoflavones	40 mg	16	Aquatic Exercise	1 hour
17	Anti-Inflammatory Diet		18	Jumping	15 minutes
19	Vitamin C	2000 mg	20	Dietary Protein	
21	Zinc	10 mg	22	Vitamin K	90 mcg
23	Dietary Vitamin K		24	Dietary Vitamin K1	
25	Vitamin K1	90 mcg	26	Leafy Green Vegetables	
27	Tea		28	Avoid Cadmium Exposure	
29	Whole-Body Vibration	15 minutes	30	Walking	30 minutes
31	Dietary Iron		32	Stability Training	30 minutes

33	Dietary Selenium		34	Green Tea	400 mg
35	Mediterranean Diet		36	Pilates	30 minutes
37	Methylfolate	400 mcg	38	Dietary Magnesium	
39	Limit Salt Intake		40	Magnesium	250 mg
41	Lactoferrin	100 mg	42	Soy Protein	20 g
43	Genistein	30 mg	44	Yoga	30 minutes
45	Gentle Yoga	20 minutes	46	Dietary Vitamin E	
47	Tai Chi	1 hour	48	Dietary Omega-3 Fatty Acids	
49	Chicory		50	Avoid PAHs Exposure	
51	Vitamin B12	100 mcg	52	Kefir	
53	Lycopene	10 mg	54	DHEA (Dehydroepiandrosterone)	25 mg
55	Greek Yogurt		56	Tomato	
57	Prunes		58	Avoid Lead Exposure	
59	White Kwao Krua (Pueraria Mirifica)	10 mg	60	Royal Jelly	300 mg
61	Red Clover	40 mg	62	Melatonin	500 mcg
63	Tocotrienols	100 mg	64	Gamma-Linolenic Acid (GLA) And EPA	1 g
65	Olive Leaf Extract	500 mg	66	Dietary Beta-Carotene	
67	Lactobacillus Reuteri	10 billion CFU	68	Collagen Peptides	10 g
69	Avoid Air Pollution		70	Extra Virgin Olive Oil (EVOO)	
71	Avoid Arsenic Exposure		72	Balance And Mobility Training	30 minutes

73	Pycnogenol	100 mg	74	Maca	2 g
75	Shilajit	500 mg	76	Perilla Oil	600 mg
77	Fructooligosaccharides (FOS)	3 g	78	Avoid PFAS Exposure	
79	Blackcurrent Supplement		80	Avoid Exposure to Heavy Metals	
81	Blackcurrants		82	Avoid Phthalate Exposure	
83	Shock Wave Therapy		84	Tennis	
85	Avoid Dioxin		86	Riboflavin (Vitamin B2)	25 mg
87	Calcium Alpha-Ketoglutarate (Ca-AKG)	1000 mg	88	Cupping Therapy and Acupuncture	
89	Geranylgeraniol	150 mg	90	EPA (Omega-3)	500 mg
91	Alpha-Linolenic Acid (ALA)		92	Cupping Therapy	15 minutes
93	Gamma-Linolenic Acid (GLA)	200 mg	94	Acupuncture	1 hour
95	Avoid L-Tyrosine Supplements				

1

Strength Training

IMPACT

5 / 5

EVIDENCE

4 / 5

How to implement

Engage in strength training exercises, such as weight lifting or bodyweight exercises, for 60 minutes per session, 2 to 3 times per week. Ensure you work all major muscle groups and rest each muscle group for at least 48 hours before exercising it again.

TYPICAL STARTING DOSE

1 hour

Description

Strength training, also called resistance or *anaerobic* training, contracts the muscles against an external resistance for short periods of time. This helps gain muscle strength, tone, and mass. This can include activities like weight lifting, pushups, and crunches.

Strength training, also known as resistance training, is a type of physical exercise that uses resistance to build strength, anaerobic endurance, and size [R]. Some of the most common strength training methods include [R]:

- Weight lifting
- Bodyweight exercises like push-ups, pull-ups, squats, and lunges.
- Resistance bands
- Plyometrics or explosive force exercises

The benefits of strength training are numerous, and include [R]:

- Increased muscle strength
- Improved bone health
- Reduced risk of injury
- Improved balance and coordination
- Enhanced mood
- Boost metabolism

Consult with a doctor before starting any new exercise program, especially if you have any health conditions.

How it helps

Experts agree that exercise may help prevent osteoporosis. It may also reduce pain and improve function in those who already have the disease [R, R, R, R, R, R].

Three meta-analyses (the most recent one with 17 studies) found resistance exercise had low-to-moderate effects on preventing bone loss at the lumbar spine and femoral neck by maintaining cortical and trabecular volumetric bone mineral density in postmenopausal women [R, R, R].

Exercise may help by increasing bone mineral density [R, R, R, R, R, R, R, R].

PERSONALIZED TO YOUR GENES

Strength training may increase BMD more in people with your **VDR** gene variant [R].

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
VDR	rs2228570	GA	

2



Exercise At Least One Hour a Day

IMPACT

4 / 5

EVIDENCE

5 / 5

How to implement

Dedicate a minimum of 60 minutes to moderate-intensity activities such as brisk walking, swimming, or cycling. Do this most days of the week, aiming for at least 5 days to optimize benefits.

TYPICAL STARTING DOSE

1 hour

Description

[Exercise](#) can do wonders for your health. It can help you lose weight, improve your heart health, boost your mood, and more [\[R\]](#).

There are many ways you can be active. You can walk, run, swim, dance, or play team sports. **Everything counts, and it's never too late to start!**

Try to get at least **60 minutes of moderate physical activity on most days**, including walking. **Getting a mix of cardio (min 150 min/day) and strength training (min 2 times a week) may be optimal.**

How it helps

Experts agree that exercise may help prevent osteoporosis. It may also reduce pain and improve function in those who already have the disease [\[R, R, R, R, R, R\]](#).

It may also reduce the risk of bone fractures [\[R, R\]](#).

Exercise may help by increasing bone mineral density [\[R, R, R, R, R, R, R, R, R\]](#).

Types of exercise that may support bone health include:

- Aerobic exercise [\[R, R, R, R, R\]](#)
- Resistance exercise [\[R, R, R\]](#)
- High-impact exercise (e.g., jumping) [\[R, R, R, R\]](#)

Combinations of the above exercises may also help [\[R, R, R, R\]](#).

3



Dietary Calcium

IMPACT4 / 5

EVIDENCE5 / 5

How to implement

Consume 1,000-1,200 mg of calcium daily through dietary sources such as dairy products (milk, yogurt, cheese), green leafy vegetables (kale, broccoli), and fortified foods (orange juice, plant-based milks). Adults under 50 need 1,000 mg per day, while those over 50 should aim for 1,200 mg per day.

Description

Dietary calcium is a mineral found in dairy products, leafy greens, and fortified foods. It is essential for bone health, muscle function, and nerve transmission.

[Calcium](#) is the most abundant mineral in the human body. It is vital for the bones, heart, muscles, and nervous system [\[R\]](#).

Your body gets calcium from food and needs vitamin D to help absorb it. Calcium can be found in a variety of foods, including [\[R\]](#):

- Dairy products
- Green, leafy vegetables
- Fish with edible soft bones (e.g., sardines)
- Calcium-fortified foods and beverages

How it helps

Experts recommend getting enough calcium throughout life, as part of a healthy diet, to help reduce the risk of osteoporosis [\[R, R, R, R\]](#).

Calcium is the main mineral that builds the bones and keeps them strong [\[R, R, R, R\]](#).

Getting more calcium may slow the rate of bone loss in older adults. The effect on fracture prevention is less clear [\[R, R, R, R, R, R, R, R, R\]](#).

Calcium combined with vitamin D appears to be more helpful than calcium alone in preventing fractures. However, increased intake from supplements did not always show a benefit [\[R, R, R, R, R, R, R, R\]](#).

Dairy products are rich in calcium. They may help strengthen the bones and reduce the risk of osteoporosis and fractures. However, not all studies found a benefit [\[R, R, R, R, R, R, R, R\]](#).

In addition to calcium, dairy contains other nutrients important for healthy bones. These include [\[R, R\]](#):

- Vitamin D
- Magnesium
- Protein



PERSONALIZED TO YOUR GENES

In people with your [VDR](#) gene variant, optimal calcium intake may be particularly important for strong bones [\[R\]](#), [\[R\]](#), [\[R\]](#).
Increased calcium intake may reduce the negative effects of your [LRP5](#) gene variant on bone health [\[R\]](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
VDR	rs1544410	CT	
GENE	SNP	GENOTYPE	EVIDENCE
LRP5	rs4988321	AG	

4



Maintain Optimal Vitamin D Levels

IMPACT

4 / 5

EVIDENCE

5 / 5

How to implement

Check your vitamin D levels, they should ideally be in the 30-66 ng/mL range. If your levels are lower than that, take a vitamin D supplement, 1000-4000 IU daily, to reach an optimal range.

TYPICAL STARTING DOSE

1000 iu

Description

Vitamin D, often referred to as the "sunshine vitamin," can be synthesized by the skin when exposed to sunlight, as well as being found in fish, eggs, and fortified milk. It helps regulate calcium absorption, promoting strong bones and a healthy immune system. Vitamin D deficiency can lead to conditions like rickets in children and osteoporosis in adults.

Your body needs [vitamin D](#) for strong bones. Vitamin D also plays a role in [\[R\]](#):

- Mood
- Immunity
- Heart health
- Blood sugar control

[Sunlight](#) is our main source of vitamin D. Experts recommend getting at least **5-15 minutes of midday sun, 2-3 times per week**. People with darker skin and those living at high latitudes may need longer periods of sun exposure [\[R, R\]](#).

Foods like fish, eggs, and fortified milk provide small amounts of vitamin D. **People lacking vitamin D should consider taking a supplement** [\[R\]](#).

How it helps

Low levels of vitamin D may increase the risk of fractures [\[R, R\]](#).

In line with this, **getting more vitamin D** may support bone health and decrease fracture risk. [\[R, R, R, R, R, R, R\]](#).

Experts recommend vitamin D supplements for people who can’t get enough from sunlight. Supplement doses between **600-2,000 IU/day** appear to help the most. **However, some studies found benefits only in people who were deficient** [\[R, R, R, R, R, R\]](#).

In addition, **some studies show that vitamin D supplements may help when combined with calcium or vitamin K**. Other studies found no benefit [\[R, R, R, R, R\]](#).

Vitamin D may help support bone health by [\[R, R, R\]](#):

- Increasing calcium and phosphorus absorption from food
- Increasing calcium levels in bones
- Promoting bone formation

Please note: *Medical bodies recommend against taking more than 4,000 IU per day. Extremely high doses may have negative effects on bone strength* [\[R, R\]](#).



PERSONALIZED TO YOUR GENES

People with your **GC** variant may have lower vitamin D levels. For this reason, they may have weaker bones [R, R]. Make sure to get enough vitamin D to maintain strong bones.

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
GC	rs7041	AC	



Practice Exercise Snacks



How to implement

Integrate short bursts of physical activity, each lasting about 1 to 2 minutes, into your daily routine at least two to three times a day. These 'exercise snacks' can include activities like doing a set of stairs, rapid bodyweight exercises, pull-ups, push-ups, sit-ups, or brisk walking.

TYPICAL STARTING DOSE

1 minutesute

Description

Staying physically active is essential for maintaining overall health and well-being. **Exercise snacks** are brief, frequent bursts of physical activity integrated into daily routines, helping combat the health risks associated with prolonged sitting and sedentary behavior, such as obesity and cardiovascular issues. Examples include taking the stairs or doing quick exercises during work breaks.

Staying active can do wonders for your health. It can help you lose weight, improve your heart health, boost your mood, and more [R].

Exercise snacks are short, quick bursts of physical activity performed throughout the day, designed to break up prolonged periods of sitting or inactivity. These brief bouts of exercise can be as short as a few minutes and are incorporated into daily routines to boost overall physical activity levels.

Exercise snacks are crucial for health because they combat the negative effects of sedentary behavior, such as prolonged sitting, which is associated with an increased risk of obesity, cardiovascular diseases, diabetes, and musculoskeletal issues. They help improve blood circulation, regulate blood sugar levels, and enhance mood and cognitive function.

Examples of exercise snacks include taking the stairs instead of the elevator, doing a few minutes of bodyweight exercises (e.g., squats or push-ups) during work breaks, or walking briskly for a few minutes after meals. These short, frequent bursts of activity contribute to a more active lifestyle and can significantly benefit overall health by reducing the risks associated with excessive sitting.

How it helps

Experts agree that exercise may help prevent osteoporosis. It may also reduce pain and improve function in those who already have the disease [R, R, R, R, R, R].

Two meta-analyses (the largest one with 59 studies) found physical activity effective at preventing osteoporosis, especially at the lumbar spine, in people older than 65 years old [R, R].

In people already suffering from this condition, exercise improves physical function, pain, vitality, and quality of life according to 2 meta-analyses (the largest one with 28 studies and 2,113 participants) [R, R].

Exercise may help by increasing bone mineral density [R, R, R, R, R, R, R, R, R].

6



Calcium Supplements

IMPACT4 / 5

EVIDENCE4 / 5

How to implement

Take 500-600 mg of calcium supplement twice daily with food. For best absorption, do not exceed 600 mg at one time and ensure a total daily intake of 1000-1200 mg from all sources, including diet. Continue indefinitely for ongoing support of bone health.

TYPICAL STARTING DOSE
1000 mg

Description

Calcium supplements are commonly used to support bone health and prevent conditions like osteoporosis. Adequate calcium intake is essential for maintaining strong bones and teeth.

[Calcium](#) is the most abundant mineral in the human body. It is vital for the bones, heart, muscles, and nervous system [\[R\]](#).

Your body gets calcium from food and needs vitamin D to help absorb it. Calcium can be found in a variety of foods, including [\[R\]](#):

- Dairy products
- Green, leafy vegetables
- Fish with edible soft bones (e.g., sardines)
- Calcium-fortified foods and beverages

How it helps

Experts recommend getting enough calcium throughout life, as part of a healthy diet, to help reduce the risk of osteoporosis [\[R, R, R, R\]](#).

Calcium is the main mineral that builds bones and keeps them strong [\[R, R, R, R\]](#).

Getting more calcium may slow the rate of bone loss in older adults. The effect on fracture prevention is less clear [\[R, R, R, R, R, R, R, R, R\]](#).

Calcium combined with vitamin D appears to be more helpful than calcium alone in preventing fractures. However, increased intake from supplements did not always show a benefit [\[R, R, R, R, R, R, R, R\]](#).

Please note: calcium competes with iron for absorption in the intestines, potentially exacerbating anemia or making it harder to manage. If you have anemia, consult your healthcare provider before using calcium supplements.

7



Vitamin D and Calcium

IMPACT

4 / 5

EVIDENCE

4 / 5

How to implement

Take 600 IU of vitamin D and 1000 mg of calcium daily. For adults over 70 years, the vitamin D intake should be increased to 800 IU daily. These supplements can be taken together or separately, usually with a meal to enhance absorption, and it is advisable to continue this regimen as part of your daily routine indefinitely unless advised otherwise by a healthcare provider.

Description

Vitamin D plus calcium supplements typically combine vitamin D, often sourced from sunlight exposure or dietary sources, with calcium, primarily found in dairy products and leafy greens. This combination is used to promote bone health, reduce the risk of osteoporosis, and support overall musculoskeletal well-being.

How it helps

Calcium combined with vitamin D appears to be more helpful than calcium alone in preventing fractures. However, increased intake from supplements did not always show a benefit [\[R, R, R, R, R, R, R, R\]](#).

Calcium is the main mineral that builds the bones and keeps them strong [\[R, R, R, R\]](#).

Vitamin D may help support bone health by [\[R, R, R\]](#):

- Increasing calcium and phosphorus absorption from food
- Increasing calcium levels in bones
- Promoting bone formation

Please note: Medical bodies recommend against taking more than 4,000 IU per day. Extremely high doses may have negative effects on bone strength [\[R, R\]](#).

8



Strontium Citrate

IMPACT4 / 5

EVIDENCE3 / 5

How to implement

Take at least 125 mg of strontium citrate daily, preferably on an empty stomach before bedtime to optimize absorption. It is recommended to continue this supplementation for at least 3 months to evaluate its effectiveness.

TYPICAL STARTING DOSE
125 mg

Description

Strontium citrate is a dietary supplement that may support bone health by increasing bone density and reducing the risk of fractures. It is sometimes used as an alternative to calcium supplements for individuals with osteoporosis.

How it helps

Strontium citrate aids in strengthening bones and increasing bone density by stimulating the creation of new bone cells. This supplement, therefore, is beneficial for individuals with low bone mass such as those with osteoporosis.

Six meta-analyses (the largest one with 107 trials and 193,987 postmenopausal women) identified strontium ralenate among the drugs helping with osteoporosis. However, other drugs such as zoledronate, romosozumab, abaloparatide, or teriparatide were more effective. A Cochrane review of 4 trials found silver-level evidence that strontium ralenate (0.5-2 g/day for treatment and 0.125-1 g/day for prevention) reduces vertebral fractures (by 37%) and non-vertebral fractures (by 14%) while increasing BMD in postmenopausal women. A meta-analysis of 2 trials also concluded that strontium ralenate reduces the risk of both vertebral and non-vertebral fractures in postmenopausal osteoporosis [\[R, R, R, R, R, R, R, R\]](#).

9



Basketball

IMPACT

4 / 5

EVIDENCE

3 / 5

How to implement

Engage in playing basketball for at least 30 minutes to an hour, three to four times a week. Ensure to warm up with stretches or light jogging for 5-10 minutes before playing to reduce the risk of injury.

TYPICAL STARTING DOSE

30 minutes

Description

Playing basketball is a fun and active way to improve cardiovascular fitness, coordination, and teamwork skills. It promotes physical fitness and can be an enjoyable form of exercise.

How it helps

Experts agree that exercise may help prevent osteoporosis. It may also reduce pain and improve function in those who already have the disease [\[R, R, R, R, R, R\]](#).

Basketball is especially effective (when compared to no exercise, swimming, soccer, and volleyball) at increasing bone mineral density according to a meta-analysis [\[R\]](#).

Exercise may help by increasing bone mineral density [\[R, R, R, R, R, R, R, R\]](#).

10



Soy

IMPACT

4 / 5

EVIDENCE

3 / 5

How to implement

Incorporate soy-based products such as tofu, soy milk, and edamame into your daily diet. Aim for at least one serving per day, equivalent to about a cup of soy milk, a half-cup of cooked soybeans, or a 3-ounce piece of tofu.

Description

Soy is a legume native to East Asia, and its health benefits include being a source of plant-based protein, fiber, and various vitamins and minerals. It is known for its potential to support heart health, reduce cholesterol levels, and provide essential nutrients in vegetarian and vegan diets.

Soy is a common food in many cuisines around the world, especially Asian cuisines [\[R\]](#).

It’s a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

Soy-based foods include [\[R\]](#):

- Soy beverages
- Tofu
- Tempeh
- Edamame
- Miso
- Natto

Soy protein and soy isoflavones are also available as supplements.

How it helps

Eating more soy or supplementing with soy isoflavones may strengthen the bones. However, not all studies found a benefit [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Soy isoflavones mimic estrogen in the body. Estrogen is a sex hormone that helps protect bones. Thus, soy may help prevent bone loss. It may be especially helpful for women after menopause [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).



PERSONALIZED TO YOUR GENES

Eating more soy may reduce the negative impact of your [VDR](#) gene variant on bone strength [\[R\]](#), [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
VDR	rs1544410	CT	

11



Vitamin K2

IMPACT

4 / 5

EVIDENCE

3 / 5

How to implement

Take a vitamin K2 supplement once daily with a meal that contains fat, as fat increases its absorption. The recommended dosage can vary depending on the specific supplement but typically ranges from 100 to 300 micrograms per day. It is important to continue this supplementation daily for ongoing benefits to bone and cardiovascular health.

TYPICAL STARTING DOSE

100 mcg

Description

Vitamin K2 is a beneficial nutrient we often lack. It's like a traffic cop for your body, directing calcium to your bones and teeth where it's needed, rather than letting it clog up your arteries and organs. Ensuring you get enough Vitamin K2 boosts your bone and heart health.

How it helps

Vitamin K2 assists in the process of moving calcium from your bloodstream into your bones, thus strengthening them and improving bone health. If bone health is weak, this supplement can boost it by furnishing necessary resources for bone renewal and repair.

Vitamin K2 benefits postmenopausal women's bone health by maintaining bone density, reducing fractures, and improving osteocalcin levels. Studies support its positive impact when used alone or with vitamin D and calcium. However, more extensive, high-quality trials are needed for conclusive evidence [\[R, R, R, R\]](#).

Vitamin K2 supplementation in various studies showed positive effects on bone health. In postmenopausal women, it prevented trabecular bone deterioration, reduced bone loss, and increased adiponectin levels when added to calcium and vitamin D. It also improved bone markers in women undergoing leuprolide therapy [\[R, R, R, R, R\]](#).

Vitamin K2 shows potential benefits for bone health in various medical conditions. In a clinical trial with 110 women receiving leuprolide therapy for estrogen-dependent diseases, vitamin K2 improved bone markers. In separate studies, it enhanced bone health in prepubertal children, acute lymphoblastic leukemia patients, chronic glomerulonephritis patients, hemodialysis patients, and cirrhosis patients. It also improved lumbar spine BMD after lung and heart transplantation [\[R, R, R, R, R, R, R, R\]](#).

Please note: *Vitamin K can interact with blood thinners (e.g., Coumadin). Make sure to consult your doctor before supplementing with vitamin K or drastically changing your dietary intake.*

 PERSONALIZED TO YOUR GENES

Supplementation with vitamin K2 may reduce the risk of osteoporosis and osteopenia in people with your [GGCX](#) gene variant [\[R, R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
GGCX	rs699664	CT	

12



Dairy Products

IMPACT4 / 5

EVIDENCE3 / 5

How to implement

Incorporate 2-3 servings of low-fat or fat-free dairy products into your daily diet. One serving could be 8 ounces of milk, 1 cup of yogurt, or 1.5 ounces of cheese. Choose options that are low in added sugars and consume as part of balanced meals or snacks throughout the day.

Description

Dairy products, such as milk, yogurt, and cheese, are rich sources of calcium and protein. They are essential for bone health, providing nutrients that support strong bones and teeth, as well as overall nutritional well-being.

Dairy products are made from milk. They include [\[R\]](#):

- Cheese
- Yogurt
- [Kefir](#)
- Butter
- Cream

Dairy products contain high levels of [calcium](#). Calcium helps build strong bones [\[R\]](#).

How it helps

Dairy products are rich in calcium. They may help strengthen the bones and reduce the risk of osteoporosis and fractures. However, not all studies found a benefit [\[R, R, R, R, R, R, R, R\]](#).

Three meta-analyses (the largest one with 10 studies) associated high intake of milk and dairy products with **up to 75% reduced risk of low bone mineral density**, while reduced intake was associated with **1.7-3% lower hip bone mineral density**. Dairy products also reduced the risk of fractures. Three meta-analyses found that high dairy intake reduced the risk of fractures at any site (by 5%), the hip (by 20.5%), and vertebrae (by 22%). Yogurt was especially effective at reducing hip fractures (by 28-31.5%), while milk only reduced the risk in the US (by 25%). Cheese failed to prevent fractures but decreased bone resorption markers [\[R, R, R, R, R\]](#).

In addition to calcium, dairy contains other nutrients important for healthy bones. These include [\[R, R\]](#):

- Vitamin D
- Magnesium
- Protein

13



Aerobic Exercise (Cardio)

IMPACT3 / 5

EVIDENCE4 / 5

How to implement

Engage in at least 150 minutes of moderate-intensity aerobic exercise or 75 minutes of vigorous-intensity activity each week. Distribute this time over at least 3 days per week, avoiding consecutive days of vigorous exercise to allow for recovery.

TYPICAL STARTING DOSE

1 hour

Description

Engaging in regular aerobic exercise, such as running, swimming, or cycling, offers numerous health benefits, including improved cardiovascular fitness, weight management, and mood enhancement. It supports overall physical and mental well-being while reducing the risk of chronic diseases.

Cardio, short for cardiovascular exercise, is any type of physical activity that temporarily increases your heart rate. Examples include **running, cycling, swimming, and brisk walking**.

Regular cardio exercise has many benefits for your overall health. It can help lower your risk of heart disease and diabetes, support weight loss, and improve your mood and energy levels. To get the most out of cardio, try to do it for at **least 30 minutes, 3-5 times a week**.

Interval training is a type of cardio that combines periods of high-intensity training with brief rest periods.

How it helps

Experts agree that exercise may help prevent osteoporosis. It may also reduce pain and improve function in those who already have the disease [\[R, R, R, R, R, R\]](#).

Aerobic exercise has moderate effects on bone mineral density at the hip and lumbar spine according to 2 meta-analyses (the largest one with 10 studies) [\[R, R\]](#).

Exercise may help by increasing bone mineral density [\[R, R, R, R, R, R, R, R\]](#).

14



Dietary Vitamin C

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Incorporate foods rich in Vitamin C into your daily diet, such as oranges, strawberries, red peppers, kale, and broccoli. Aim to consume 5 servings of fruits and vegetables per day to meet the recommended dietary allowance of Vitamin C, which is 90 mg for adult men and 75 mg for adult women.

Description

Vitamin C is an antioxidant that supports the immune system, collagen production, and wound healing. It also enhances iron absorption from plant-based foods and contributes to overall health.

[Vitamin C](#) is an essential nutrient. This means that our bodies can’t produce it on their own, so we have to get it from food or supplements [\[R\]](#).

Vitamin C has antioxidant properties. It supports immunity, heart health, and wound healing [\[R, R\]](#).

Vitamin C deficiency is called *scurvy*. In the past, many sailors suffered from it [\[R\]](#).

How it helps

Getting more vitamin C may increase bone mineral density and help prevent osteoporosis. However, it may not help heal fractures [\[R, R\]](#).

Vitamin C helps make collagen. This protein is essential for bone health [\[R\]](#).

 PERSONALIZED TO YOUR GENES

Your [COL1A1](#) gene variant is linked to weaker bones and higher odds of osteoporosis. It likely reduces collagen production. Vitamin C may help by boosting collagen production [\[R, R, R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
COL1A1	rs1800012	AC	

15



Soy Isoflavones

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Take a soy isoflavone supplement containing 40 to 80 milligrams daily, ideally with food to improve absorption. This dosage can be continued on a daily basis for several months, but it's recommended to reevaluate its effectiveness and any potential side effects with a healthcare provider periodically.

TYPICAL STARTING DOSE

40 mg

Description

Soy isoflavones are natural compounds found in soybeans and soy products. They are phytoestrogens, which means they can mimic the effects of estrogen in the body and are associated with potential health benefits like menopausal symptom relief and improved heart health.

Soy is a common food in many cuisines around the world, especially Asian cuisines [\[R\]](#).

It's a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

Soy-based foods include [\[R\]](#):

- Tofu
- Tempeh
- Edamame
- Miso
- Natto

Soy protein and soy isoflavones are also available as supplements.

How it helps

Six meta-analyses (the largest one with 52 trials) concluded that supplementation with soy isoflavones (41.9-300 mg/day for 3-24 months) increases bone mineral density at the spine (by 20.6-28.5 mg/cm² or by 0.76-2.38%), hip (by 0.22%), and femoral neck (by 2.27%), and the bone formation markers BAP (by 1.48 µg/L or 5.50-8%), osteocalcin (by 4.16-10.3%), osteoprotegerin (by 5.79 pg/mL), while decreasing the bone resorption markers DPD (by 2.08 nmol/mmol or 7.48-14.1%), pyridinoline (by 5.13 nmol/mmol or 12.09%), and C-telopeptides (by 0.08 ng/mL), in postmenopausal and perimenopausal women. In those with osteoporosis, 75 mg/day increased bone mineral density by 54% and reduced DPD by 23% according to another meta-analysis of 19 trials [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Similarly, a meta-analysis of 3 studies and 1,658 participants found that the consumption of natto increases the bone mineral density of the lumbar spine, but not the hip [\[R\]](#).

However, two meta-analyses (the largest one with 12 trials and 1,433 participants) found soy isoflavone supplementation ineffective at improving bone mineral density [\[R\]](#), [\[R\]](#).

Soy isoflavones mimic estrogen in the body and may prevent bone loss and other symptoms of menopause [\[R\]](#).

16



Aquatic Exercise

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Participate in aquatic exercise sessions, such as swimming or water aerobics, for 60 minutes, 3 to 5 times per week. Ensure the exercise intensity is moderate, allowing you to talk but not sing during the activity. Consistency over time is key, so aim to incorporate this into your weekly routine for at least 3 to 6 months to observe benefits.

TYPICAL STARTING DOSE

1 hour

Description

Aquatic exercise involves physical activity performed in water, such as swimming, water aerobics, or aquatic therapy. It is gentle on the joints, making it suitable for individuals with mobility issues, and can help improve cardiovascular fitness and muscle strength.

Aquatic exercise is any type of low-impact physical activity performed in a pool. In this type of cardio exercise, water helps the body float, which reduces gravity and makes the practice more comfortable and tolerable [\[R\]](#), [\[R\]](#).

Compared to land-based exercise, aquatic exercise may be better by [\[R\]](#):

- Reducing the stress and impact on joints
- Lowering fracture risk

Hence, it is usually **recommended for the elderly**. Aquatic exercise is also suitable for people who don't know how to swim [\[R\]](#).

How it helps

A meta-analysis of 11 studies and 629 participants concluded that aquatic exercise improves bone mineral density in postmenopausal women. However, land-based exercise was found to be more effective [\[R\]](#).

17



Anti-Inflammatory Diet

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate foods rich in omega-3 fatty acids, such as salmon and flaxseeds, fruits, vegetables, nuts, and whole grains into your daily meals. Avoid processed foods, red meats, and refined sugars. Aim for a balanced diet consisting mostly of plant-based foods and lean protein sources, adjusting portions sizes to meet your individual nutritional needs and health goals.

Description

An anti-inflammatory diet focuses on reducing inflammation in the body by emphasizing foods rich in anti-inflammatory compounds, such as fruits, vegetables, fatty fish, nuts, and seeds, while minimizing processed foods and those high in added sugars and trans fats.

Anti-inflammatory diets use healthy foods to reduce inflammation. These diets are generally high in [\[R, R, R\]](#):

- Colorful fruits and vegetables
- Nuts and seeds
- Fish
- Olive oil
- Tea

They also tend to restrict [\[R, R\]](#):

- Processed food
- Sugar and refined carbs
- Red meat

The [Mediterranean diet](#) and the DASH diet are good examples of anti-inflammatory diets [\[R, R\]](#).

How it helps

Some diets tend to increase inflammation and weaken the bones. One example is the Western diet, which is high in processed foods. People who eat these diets may have a **higher risk of osteoporosis and fractures** [\[R, R, R, R, R\]](#).

On the other hand, an anti-inflammatory diet may support bone health. **The Mediterranean diet** is a good example. It may **strengthen the bones and prevent fractures** [\[R, R, R, R\]](#).

18



Jumping

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate jumping exercises, such as jump squats or jumping jacks, into your fitness routine. Aim for at least 3 sessions per week, each session lasting 10-15 minutes. Ensure to have rest days in between to allow for muscle recovery.

TYPICAL STARTING DOSE
15 minutes

Description

Jumping, such as through activities like jumping jacks or trampolining, is a cardiovascular exercise that can improve heart health, strengthen muscles, and boost overall fitness. It's an effective way to increase physical activity and promote a healthy lifestyle.

How it helps

Experts agree that exercise may help prevent osteoporosis. It may also reduce pain and improve function in those who already have the disease [R, R, R, R, R, R].

A meta-analysis of 6 studies found that jumping exercise is beneficial for improving bone mineral density, especially at the hip, in premenopausal women. Two other meta-analyses found that exercise programs combining impact and resistance exercise improve bone mineral density at the hip and spine, while high-impact-alone programs only improve hip bone mineral density in this group of women [R, R, R].

Exercise may help by increasing bone mineral density [R, R, R, R, R, R, R, R].

19



Vitamin C

IMPACT3 / 5

EVIDENCE3 / 5

How to implement

Take 500-2000 mg of vitamin C supplement daily. It can be taken at any time of the day, with or without food, according to personal preference or tolerance.

TYPICAL STARTING DOSE
2000 mg

Description

[Vitamin C](#) is an essential nutrient. This means that our bodies can’t produce it on their own, so we have to get it from food or supplements [\[R\]](#).

Foods rich in Vitamin C include: [\[R\]](#)

- Citrus Fruits
- Peppers
- Brussel sprouts
- Kiwi
- Broccoli
- Tomato
- Cantaloupe
- Cauliflower
- Spinach

Vitamin C has antioxidant properties. It supports immunity, heart health, and wound healing [\[R\]](#), [\[R\]](#).

Vitamin C deficiency is called *scurvy*. In the past, many sailors suffered from it [\[R\]](#).

How it helps

A [meta-analysis of 13 studies](#) associated high dietary vitamin C intake with **increased BMD at the femoral neck and lumbar spine, as well as a 33% lower risk of osteoporosis and hip fractures** [\[R\]](#).

Similarly, a [meta-analysis of 6 studies and 10807 participants](#) associated high vitamin C intake with **~36% lower risk of hip fractures. For every 50-mg/day increase in vitamin C intake, the risk decreased by 5%** [\[R\]](#).

Please note: *Supplementing with vitamin C is linked to a slightly higher risk of kidney stones in men. Talk to your doctor before taking vitamin C* [\[R\]](#), [\[R\]](#).

20



Dietary Protein

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Include a variety of protein sources such as meat, fish, eggs, dairy, beans, and nuts in your diet every day, aiming for at least 0.8 grams of protein per kilogram of body weight. For more active individuals or those looking to build muscle, increase intake to 1.2 to 2.0 grams per kilogram of body weight daily, spread out over all meals to maximize absorption.

Description

Protein is essential for building and repairing tissues, supporting muscle growth, and maintaining overall bodily functions. Adequate protein intake is crucial for overall health and well-being.

Foods that are high in protein include:

- Eggs
- Nuts
- Beef
- Chicken
- Fish
- Yogurt
- Tofu
- Pork
- Cottage cheese

How it helps

Following a high-protein diet may protect against bone loss in people trying to lose weight. However, benefits may be limited [\[R, R, R, R, R\]](#).

In addition, supplementing with protein may not support bone strength in older adults [\[R, R\]](#).

Both vegetarian and vegan diets are associated with lower bone mineral density. These diets may be lower in nutrients that keep the bones strong, such as [\[R, R, R, R\]](#):

- Calcium
- Omega-3s
- Protein

Try to consume a variety of plant- and animal-based proteins for optimal bone health [\[R, R\]](#).

 PERSONALIZED TO YOUR GENES

In people with your [NADSYN1](#) gene variant, optimal protein intake may be particularly important for strong bones [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
KRTAP5-7	rs7944926	AA	

21



Zinc

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Take a 15 mg zinc supplement daily, ideally with a meal to enhance absorption.

TYPICAL STARTING DOSE

10 mg

Description

Zinc is an essential mineral found in various foods, including meat, dairy, and nuts. It is crucial for immune function, wound healing, DNA synthesis, and maintaining healthy skin and nails. Zinc supplements are sometimes used to support immune health and manage zinc deficiencies.

[Zinc](#) is an essential mineral. Your body needs it to [\[R\]](#), [\[R\]](#):

- Defend against disease
- Protect DNA from damage
- Heal wounds
- Control blood sugar

Some of the best sources of zinc include **shellfish, pork, beef, and beans**. It is also available as a supplement [\[R\]](#).

Adults should get **8-11 mg of zinc** per day [\[R\]](#).

How it helps

A diet low in zinc may increase bone loss. In line with this, low blood zinc levels may be linked to osteoporosis [\[R\]](#), [\[R\]](#), [\[R\]](#).

Getting enough zinc may increase bone mineral density and help broken bones heal faster. However, supplements may only benefit people with low levels of zinc [\[R\]](#), [\[R\]](#), [\[R\]](#).

Please note: *A high intake of zinc may cause stomach pain and gut irritation. Adults should not ingest more than **40 mg** of zinc per day* [\[R\]](#), [\[R\]](#).

How to implement

TYPICAL STARTING DOSE

90 mcg

Description

Vitamin K is essential for blood clotting and bone formation [R].

Good sources of vitamin K include [[R](#), [R](#)]:

- Green leafy vegetables, such as kale, spinach, and collards
- Soy products, such as natto, roasted soybeans, and edamame
- Carrot juice
- Pumpkin

Healthy adults should get **120 micrograms** of vitamin K per day [R].

How it helps

Some people with poor bone health tend to have lower blood levels of vitamin K. Higher blood levels of vitamin K are linked to a lower risk of fractures [R, R, R, R, R, R, R, R, R].

Getting more vitamin K from food or supplements may strengthen the bones and decrease the risk of fractures. However, some studies didn't support this link [R, R, R, R, R, R, R, R, R, R, R, R].

Vitamin K may help by [\[R\]](#):

- Activating a protein essential for building bones
- Increasing calcium levels

Please note: Vitamin K can interact with blood thinners (e.g., Coumadin). Make sure to consult your doctor before supplementing with vitamin K or drastically changing your dietary intake.

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Dietary Vitamin K

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate foods high in Vitamin K into your daily diet, such as green leafy vegetables (kale, spinach, broccoli), fish, liver, meat, and eggs. Aim to include at least one serving of these foods in each meal, amounting to 3 servings per day.

Description

Vitamin K is essential for blood clotting and bone health. It helps prevent excessive bleeding and contributes to the development and maintenance of strong bones.

[Vitamin K](#) is essential for blood clotting and bone formation [\[R\]](#).

Good sources of vitamin K include leafy greens, soy products, and carrots [\[R, R\]](#).

How it helps

Some people with poor bone health tend to have lower blood levels of vitamin K. Higher blood levels of vitamin K are linked to a lower risk of fractures [\[R, R, R, R, R, R, R, R, R\]](#).

Getting more vitamin K from food or supplements may strengthen the bones and decrease the risk of fractures. However, some studies didn't support this link [\[R, R, R, R, R, R, R, R, R, R, R, R\]](#).

Vitamin K may help by [\[R\]](#):

- Activating a protein essential for building bones
- Increasing calcium levels

Please note: *Vitamin K can interact with blood thinners (e.g., Coumadin). Make sure to consult your doctor before supplementing with vitamin K or drastically changing your dietary intake.*

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Dietary Vitamin K1

IMPACT3 / 5

EVIDENCE2 / 5

How to implement

Incorporate foods rich in Vitamin K1 into your daily diet. Include green leafy vegetables like kale, spinach, and broccoli, as well as other sources like soybeans and carrots. Aim for at least one serving of these foods per day to meet the recommended dietary allowance for Vitamin K1.

Description

Vitamin K1, primarily found in leafy green vegetables, is essential for blood clotting and supports overall cardiovascular health. It plays a crucial role in maintaining healthy blood vessels.

How it helps

Vitamin K1 helps in maintaining bone health by assisting in the production of proteins needed for bone building and repair. A regular intake thus can potentially reduce the risk of fractures and osteoporosis.

Please note: *Vitamin K can interact with blood thinners (e.g., Coumadin). Make sure to consult your doctor before supplementing with vitamin K or drastically changing your dietary intake.*

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Vitamin K1

IMPACT3 / 5

EVIDENCE2 / 5

How to implement

Take a vitamin K1 supplement once daily with a meal that includes fat, as fat increases its absorption. The dosage can vary depending on individual needs, but a common dose is between 90-300 micrograms. Continue this regimen daily for ongoing health benefits, particularly for bone and cardiovascular health.

TYPICAL STARTING DOSE

90 mcg

Description

Vitamin K encompasses two main forms: vitamin K1 (phylloquinone) and vitamin K2 (menaquinone). Vitamin K1 is primarily found in leafy green vegetables and plays a crucial role in blood clotting. Vitamin K2, sourced from animal products and fermented foods, is known for its potential to promote bone health and cardiovascular wellness.

How it helps

Vitamin K1 aids in bone health by helping our body's proteins bind to calcium, an essential element for bone health. It also may help to reduce bone loss and decrease the risk of fractures.

A meta-analysis linked higher dietary vitamin K1 intake to a 28% lower fracture risk, with a 3% risk reduction for each 50-µg/day increase. Most of thirteen trials favored phytonadione and menaquinone in reducing bone loss. A high-vitamin K diet in a non-placebo trial suppressed ucOC and ucOC/tOC in 30 healthy volunteers. A meta-analysis found that vitamin K and calcium combo increased lumbar spine BMD and reduced UcOC; both K1 and K2 improved BMD, with K2 slightly more effective [R, R, R, R].

In a placebo-controlled trial for postmenopausal women, vitamin K1 (1 mg/day) with mineral + vitamin D (8 µg/day) reduced femoral neck bone loss more than the mineral + vitamin D supplement alone in 3 years. Another trial with vitamin K1 (150 µg/day), genistein (30 mg/day), vitamin D3 (800 IU/day), and PUFAs (1 g PUFAs, EPA/DHA ratio ~2/1) maintained femoral neck BMD in 70 postmenopausal women [R, R].

However, supplementation with vitamin K1 (200-500 mcg/day), with or without vitamin D, for 6-16 weeks **improved vitamin K status but failed to affect bone turnover** in 2 placebo-controlled trials of postmenopausal women and elderly hip fracture patients [R, R].

Genetically predicted vitamin K levels may not be causally associated with the risk of OA overall, knee, hip, spine, hand OA, or joint replacement [R].

Please note: *Vitamin K can interact with blood thinners (e.g., Coumadin). Make sure to consult your doctor before supplementing with vitamin K or drastically changing your dietary intake.*

26



Leafy Green Vegetables

IMPACT

3 / 5

EVIDENCE

2 / 5

How to implement

Incorporate at least one serving of leafy green vegetables, such as spinach, kale, or Swiss chard, into your diet daily. This can be done by adding them to salads, smoothies, or as a side dish to your meals.

Description

Leafy green vegetables like spinach and kale are packed with vitamins, minerals, and antioxidants. Incorporating them into your diet can promote overall health by providing essential nutrients, supporting digestion, and reducing the risk of chronic diseases like heart disease and certain cancers.

Leafy green vegetables, also called leafy greens, or greens, are edible plant leaves, which can include stalks and shoots as well. Common examples include: lettuce, spinach, kale, chard, endive, and fennel.

Leafy greens contain a host of vitamins and minerals, as well as fiber. Most of them are a particularly good source of vitamin K.

How it helps

A higher dietary intake of vegetables has been associated with a decreased risk of osteoporosis in postmenopausal women [\[R\]](#).

In line with this, an increased intake of leafy green vegetables improved bone health and reduced markers of bone resorption in 2 trials [\[R\]](#), [\[R\]](#).

Leafy greens like kale and spinach are high in vitamin K, which plays a significant role in bone metabolism and helps prevent osteoporosis.

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Tea

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Drink 1-3 cups of tea daily, choosing from green, black, or herbal varieties according to preference. It's beneficial to consume tea throughout the day, either hot or cold, for ongoing hydration and health benefits.

Description

Tea is a beverage made by steeping the leaves of the *Camellia sinensis* plant in hot water. It comes in various types, including black, green, white, and herbal teas, and is known for its diverse flavors and potential health benefits due to polyphenols and other bioactive compounds.

[Green](#) and black tea are made from the same plant (*Camellia sinensis*). This plant is processed in different ways to make each type of tea [\[R, R\]](#).

Tea contains many active compounds. These include antioxidants like EGCG and amino acids like [L-theanine](#). Active components of tea help support [\[R, R, R, R, R, R\]](#):

- Heart health
- Cognition
- Immunity
- Relaxation

How it helps

Drinking tea may strengthen the bones and lower the odds of osteoporosis [\[R, R, R\]](#).

Green tea is full of polyphenols. These may help protect the bones from oxidative stress and inflammation [\[R, R\]](#).

However, drinking more tea may not lower the odds of fractures [\[R, R\]](#).

28



Avoid Cadmium Exposure

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

To avoid cadmium exposure, refrain from smoking or exposure to secondhand smoke, reduce consumption of foods high in cadmium like shellfish, liver, kidney meats, and certain leafy vegetables, and use ceramic or glass containers instead of plastic when microwaving food. Limit intake of cadmium-contaminated workplace air by using protective gear if you work in battery manufacturing, welding, or metal refining industries.

Description

Avoiding cadmium exposure is essential to prevent potential health risks associated with this heavy metal, such as kidney damage and increased cancer risk. Reducing exposure to cadmium-containing products and contaminated foods is crucial.

Heavy metals are elements naturally found in the environment. They are also used for agricultural, industrial, and medicinal purposes. Some can even be found in small amounts in your body [\[R\]](#) [\[R\]](#).

Long-term exposure to high amounts of heavy metals can be harmful to your health [\[R\]](#) [\[R\]](#).

Heavy metals that are most often linked to health problems include [\[R\]](#) [\[R\]](#):

- Lead
- Cadmium
- Arsenic
- Chromium
- Mercury

How it helps

Multiple studies suggest a link between cadmium exposure and bone health. A meta-analysis involving 21,941 fracture cases found that high cadmium exposure increases fracture risk by 30%. Environmental Cadmium, even at low levels, is associated with osteoporosis risk. Cadmium and lead exposure, especially in older adults and men, raise the risk of osteopenia or osteoporosis. Cadmium exposure is linked to Itai-itai disease symptoms in Japan. Cadmium levels are positively associated with osteoporosis prevalence, especially in women and non-smokers. However, dietary heavy metal intake doesn't significantly affect bone health in postmenopausal women [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#).

Cadmium exposure can interfere with the body's calcium metabolism—a process crucial for healthy bones.

29



Whole-Body Vibration

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Stand, sit, or lie on a machine with a vibrating platform for about 15 minutes a day, three times a week. Make sure to start with a lower intensity and gradually increase as you get more accustomed to the vibrations.

TYPICAL STARTING DOSE

15 minutes

Description

Whole-body vibration involves standing, sitting, or lying on a vibrating platform to stimulate muscle contractions. It's used in fitness routines and rehabilitation for improving muscle strength, circulation, and balance, and may benefit conditions like osteoporosis. No specific chemical compound or nutrient is associated with whole-body vibration.

Whole-body vibration is a form of exercise and treatment utilizing a vibrating platform upon which a person stands or performs various exercises. It creates vertical, oscillating vibrations with frequencies and amplitudes that can be controlled by the user [\[R\]](#).

Whole-body vibration is used for a variety of purposes, including [\[R\]](#):

- Weight loss
- Boosting strength
- Improving balance/coordination
- Boosting mood

How it helps

Multiple studies and meta-analyses indicate that whole-body vibration can improve bone density in postmenopausal women, particularly in the lumbar spine. The recommended parameters include high frequency (around 30 Hz), low magnitude (approximately 0.3 g), and high cumulative dose (around 7000 min). However, it may not be superior to exercise alone. Side-alternating platforms and certain vibration characteristics (amplitude, frequency, and posture) appear more effective. Additionally, it may reduce the risk of falls and fractures [\[R, R, R, R, R, R\]](#).

Whole-body vibration may help by stimulating your muscles and bones through rapid gentle shaking. This can enhance bone density, balance, and overall physical function.

30



Walking

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Incorporate at least 30 minutes of brisk walking into your daily routine, aiming for a minimum of five days a week. This can be done in one continuous session or broken into shorter periods, such as three 10-minute walks throughout the day.

TYPICAL STARTING DOSE

30 minutes

Description

Walking is a low-impact form of exercise that can contribute to cardiovascular fitness, weight management, and improved overall health. It is used to support physical activity goals, enhance mood, and promote better cardiovascular health.

How it helps

Walking is a weight-bearing exercise which stimulates the formation of new bone tissue, making your bones stronger. Regular walking can reduce the risk of osteoporosis and maintain healthy bone density, as it puts pressure on the bones, helping them to grow and regenerate.

A meta-analysis of 13 trials on individuals aged ≥ 50 with low BMD found nordic walking may improve Timed Up-and-Go values, multi-component interventions improve 6-min walk test and lumbar spine BMD, but not quality of life or femoral neck BMD. Data on fractures, falls, or mortality was insufficient [\[R\]](#).

In a meta-analysis of 10 studies with 768 postmenopausal women and individuals aged 50+, walking positively impacted lumbar bone density (BMD) but not femur or calcaneus BMD. Walking alone may not suffice to prevent osteoporosis; consider additional exercises for at-risk patients [\[R\]](#).

Walking as a sole exercise for perimenopausal and postmenopausal women doesn't significantly impact the lumbar spine, radius, or whole body bone mineral density (BMD). However, it does improve femoral neck BMD in interventions lasting over 6 months [\[R\]](#).

31



Dietary Iron

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Incorporate iron-rich foods into your daily meals, such as red meat, chicken, turkey, fish, beans, lentils, tofu, cooked spinach, and fortified cereals. Aim for at least 18 mg of iron per day for adult women and 8 mg per day for adult men. It's also beneficial to pair these foods with vitamin C-rich foods like oranges, strawberries, or bell peppers to enhance iron absorption.

Description

Iron (Fe) is an essential mineral. It helps make [hemoglobin](#), a protein that carries oxygen to cells. In this way, iron **increases energy** and supports **brain and immune system function** [\[R\]](#), [\[R\]](#), [\[R\]](#).

Foods rich in iron include [\[R\]](#):

- Oysters
- White beans
- Beef
- Chocolate
- Spinach
- Fortified cereals

Women should be getting **8-18 mg** of iron per day, while **men** should be getting **8 mg** [\[R\]](#).

Groups at risk of iron deficiency include [\[R\]](#):

- Menstruating women
- Children
- Vegetarians
- Routine blood donors

How it helps

A meta-analysis of 8 studies and 2,188 participants concluded that iron, zinc, and copper deficiencies are all associated with an increased risk of osteoporosis [\[R\]](#).

A non-placebo-controlled trial of 165 young women associated iron deficiency with increased bone resorption. Supplementation with iron (15 mg/day) lowered NTx levels but was more effective when combined with vitamin D (5 µg/day, 200 IU) [\[R\]](#).

However, supplementation with iron (27 mg/day) and vitamin D (1,000 IU/day) for 12 weeks had no effects on bone turnover in a placebo-controlled trial of 87 women [\[R\]](#).

Iron acts as a cofactor to many enzymes, including those that produce collagen and other bone proteins [\[R\]](#), [\[R\]](#).

Please note: *Increased iron intake from meat is linked to higher odds of diabetes and heart disease. Try to find a balance between plant and animal iron sources* [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

32

Stability Training

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Integrate stability exercises into your workout routine 2-3 times per week. These exercises include activities such as using a stability ball, performing balance exercises on a balance board, or doing body-weight exercises that focus on balance and core strength, such as planks and single-leg stands. Spend approximately 20-30 minutes per session focusing on these exercises.

TYPICAL STARTING DOSE
30 minutes

Description

Stability training is a form of exercise that focuses on enhancing core strength and balance through targeted movements and exercises, often incorporating equipment like stability balls, balance boards, or resistance bands. It helps improve overall stability and posture while reducing the risk of falls and injury.

How it helps

A meta-analysis of 6 trials found that balance training reduced falls in osteoporosis patients but had no significant impact on the Berg Balance Scale and Timed Up and Go test results [R].

Another meta-analysis of 10 trials with 684 patients found balance training may be effective in improving balance ability and reducing fear of falling in patients with osteoporosis [R].

A third meta-analysis of 8 studies and 404 participants found that perturbation-based balance training reduced fall risk and fall rates in older adults and those with Parkinson's disease [R].

Stability training exercises reduce the risk of falls, which are often the cause of bone fractures. Additionally, these exercises place a healthy amount of stress on the bones, which encourages new bone tissue formation.

33



Dietary Selenium

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Incorporate selenium-rich foods into your daily diet, such as Brazil nuts, seafood, and organ meats. Eating 1-2 Brazil nuts a day can meet the daily selenium requirement for most adults.

Description

Selenium is a trace mineral found in various foods, including nuts, seeds, and seafood. It is an essential nutrient that plays a crucial role in maintaining the body's antioxidant defenses and supporting thyroid function.

[Selenium](#) supports [\[R\]](#):

- Reproduction
- Thyroid function
- DNA production
- Immune response

Adults should be getting **55 micrograms** of selenium per day. Good sources of selenium include [\[R\]](#):

- Brazil nuts
- Fish
- Meat
- Eggs
- Rice
- Oatmeal

How it helps

A meta-analysis of 19 studies associated both high blood selenium levels and dietary selenium intake with higher bone mineral density and a decreased risk of osteoporosis and fractures [\[R\]](#).

However, a study found no causal association between selenium levels and osteoporosis [\[R\]](#).

Selenium has antioxidant properties that protect your bones from cellular damage. Additionally, it promotes the formation of new bone tissues.

34



Green Tea

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Consume 400 mg of green tea extract daily. This can be taken in the form of capsules or tablets available that specify the amount of green tea extract. Ensure the supplement is taken according to the product's specific instructions, usually once a day with water.

TYPICAL STARTING DOSE

400 mg

Description

Tea is a beverage made by steeping the leaves of the *Camellia sinensis* plant in hot water. It comes in various types, including black, green, white, and herbal teas, and is known for its diverse flavors and potential health benefits due to antioxidants and other bioactive compounds.

[Green](#) and black tea are made from the same plant (*Camellia sinensis*). This plant is processed in different ways to make each type of tea [\[R\]](#) [\[R\]](#).

Tea contains antioxidants called **flavonoids**, which may help prevent [\[R\]](#) [\[R\]](#) [\[R\]](#) [\[R\]](#):

- Heart disease
- Cancer
- Diabetes

How it helps

Three meta-analyses (the largest one with 17 studies) associated green tea consumption with a 51.5% lower risk of bone loss, 61% lower risk of osteoporosis, and higher bone mineral density at the lumbar spine, hip, femoral neck, Ward triangle, and greater trochanter [\[R\]](#) [\[R\]](#) [\[R\]](#).

However, a meta-analysis of 9 studies and 147,950 participants found tea consumption had no association with risk of fractures [\[R\]](#).

Polyphenols found in green tea may protect the bones from oxidative stress [\[R\]](#) [\[R\]](#) [\[R\]](#).

Please note: polyphenols from green tea may bind to iron and form insoluble complexes, which reduces iron absorption in the gut. If you have anemia, consult your healthcare provider before using green tea [\[R\]](#).

35



Mediterranean Diet

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Incorporate a variety of primarily plant-based foods, such as fruits, vegetables, whole grains, nuts, and legumes, into every meal. Choose healthy fats, like olive oil, over saturated fats and consume fish and poultry at least twice a week. Limit red meat to a few times a month and include a moderate amount of dairy products. Opt for water and red wine in moderation as your beverages.

Description

The [Mediterranean diet](#) is based on the traditional cuisine from the Mediterranean regions. It moderates the intake of red meat and dairy, while being rich in fruits and vegetables, whole grains, and healthy fats ([olive oil](#)).

The [Mediterranean diet](#) focuses on traditional cuisine from the Mediterranean regions. It’s rich in [\[R\]](#):

- [Olive oil](#)
- Fruits and vegetables
- Whole grains
- Nuts and seeds
- Fish

This type of diet may **reduce inflammation and protect the brain and heart** [\[R, R, R, R\]](#).

Limited intake of animal products, saturated fat, and refined sugar likely contribute to the health benefits of the Mediterranean diet [\[R\]](#).

How it helps

Two meta-analyses (the largest one with 5 studies and 353,076 participants) associated adherence to a Mediterranean diet with 26.5% reduced risk of hip fracture and higher bone mineral density in the lumbar spine (by 0.12 g/cm²), femoral neck (by 0.10 g/cm²), and total hip (by 0.11 g/cm²). Increasing the adherence index by 1 unit reduced the risk of fractures by 5%, while 2 units reduced it by 22% [\[R, R\]](#).

In a non-placebo-controlled trial of 127 elderly men, consuming a Mediterranean diet enriched in extra virgin olive oil for 2 years increased osteocalcin and P1NP levels [\[R\]](#).

The Mediterranean diet may promote bone health through the anti-inflammatory and antioxidant effects of its components [\[R, R\]](#).

36



Pilates

IMPACT2 / 5

EVIDENCE3 / 5

How to implement

Engage in Pilates exercises for at least 20-30 minutes, 3 times a week. Focus on core strength, flexibility, and mindful breathing. It is suitable for both beginners and advanced individuals, adjusting the difficulty of exercises as necessary.

TYPICAL STARTING DOSE
30 minutes

Description

Pilates is a form of exercise that focuses on strengthening the core, improving flexibility, and enhancing overall body awareness through controlled movements and breathing techniques. Its health benefits include increased core strength, improved posture, enhanced flexibility, and better balance, making it a popular choice for those seeking a holistic approach to fitness.

Pilates is a type of exercise that emphasizes proper alignment, breathing techniques, and precise movements.

It involves a series of controlled movements performed on a mat or with specialized equipment, such as a reformer or Cadillac. Pilates helps strengthen the core muscles, improve flexibility, and promote mind-body awareness.

How it helps

A meta-analysis of 11 studies and 591 participants found that practicing Pilates for 12-32 weeks helps maintain BMD in older women. However, a meta-analysis of 3 low-quality studies found no effects of Pilates on BMD of the lumbar spine, hip, or femoral neck. In 2 non-placebo-controlled trials of 100 women with osteoporosis, practicing Pilates 2x-3x/week for up to 1 year improved pain, functional status, kinesiophobia, and quality of life [\[R, R, R, R\]](#).

Pilates involves weight-bearing exercises and resistance-based movements that can stimulate bone growth, increasing bone density and strength. This can help with overall bone health and prevent conditions like osteoporosis.

37



Methylfolate

IMPACT

2 / 5

EVIDENCE

3 / 5

How to implement

Take an L-methyl folate supplement (400-800 micrograms daily), ideally with a meal, to improve absorption. This dosage is recommended for adults, including pregnant women, to support overall health, especially to reduce the risk of neural tube defects in developing fetuses. Continue daily use as part of your regular supplement routine.

TYPICAL STARTING DOSE

400 mcg

Description

Folate, a B-vitamin, is crucial for DNA synthesis, cell growth, and the formation of red blood cells. Adequate folate intake supports overall health and reduces the risk of neural tube defects during pregnancy.

[Vitamin B9](#) (*folate*) plays an essential role in [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Making DNA
- Metabolism
- Energy production

SelfDecode recommends L-methylfolate as the preferred folate supplement for those who need one. It is superior to folic acid because it doesn't require activation, but the research is still ongoing [\[R\]](#), [\[R\]](#).

How it helps

Folate helps in bone health by stimulating bone density, thus reducing the risk of fractures. It works by reducing an amino acid called homocysteine, high levels of which are associated with weak bones.

A [meta-analysis of 28 studies](#) **associated folate deficiency with fracture risk** but found that **supplementation with combined B vitamins failed to reduce it** [\[R\]](#).

In line with this, a [meta-analysis of 4 trials](#) found supplementation with **B vitamins ineffective at preventing fractures and improving bone turnover** [\[R\]](#).

In a [placebo-controlled trial of 167 patients with low vitamin B12 status](#), supplementation with a multi-vitamin complex containing folic acid (200 µg), vitamin B12 (10 µg), vitamin B6 (10 mg), and riboflavin (5 mg) for 2 years **reduced BMD decline**. However, supplementation with folic acid (2.5 mg/day), vitamin B6 (50 mg/day), and vitamin B12 (1 mg/day) for 7.3 years **failed to reduce fracture risk or rates of bone metabolism** in a [placebo-controlled trial of 300 women](#) [\[R\]](#), [\[R\]](#).

 PERSONALIZED TO YOUR GENES

People with your [MTHFR](#) gene variant may have lower BMD and increased risk of fractures if their folate intake is low [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
MTHFR	rs1801133	AA	

38



Dietary Magnesium

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Increase your intake of magnesium-rich foods such as leafy green vegetables, nuts, seeds, and whole grains. Aim to include these foods in your diet daily, following the recommended dietary allowance of 320 mg per day for women and 420 mg per day for men.

Description

Magnesium is a vital mineral involved in over 300 biochemical reactions in the body. It supports various functions, including muscle and nerve function, bone health, and blood sugar regulation.

[Magnesium](#) is an essential mineral. Your body needs it for [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Muscle, nerve, and bone function
- Blood sugar and blood pressure control
- DNA and protein production
- Strong immunity

Women need **310-320 mg** of magnesium per day, while men need **400-420 mg** [\[R\]](#).

Foods rich in magnesium include **nuts, seeds, and leafy greens**. Magnesium is also available as a supplement [\[R\]](#).

How it helps

A study of 73,684 postmenopausal women associated low magnesium intake with 2-3% lower bone mineral density. However, this didn't translate into increased risk of fractures. A meta-analysis of 12 studies also associated low magnesium intake with reduced bone mineral density in the hip and femoral neck, but not with increased risk of fractures [\[R\]](#), [\[R\]](#).

Magnesium may promote bone development and suppress bone turnover [\[R\]](#), [\[R\]](#)

39



Limit Salt Intake

IMPACT2 / 5

EVIDENCE2 / 5

How to implement

Reduce your daily salt intake to less than 2,300 milligrams (mg), equivalent to about one teaspoon of table salt. This includes all salt consumed, whether added during cooking, at the table, or present in processed and ready-to-eat foods.

Description

Limiting salt intake involves lowering the amount of sodium in the diet, which can help lower blood pressure and reduce the risk of heart disease. It often involves avoiding processed and other high-sodium foods such as cured meats, soups and sauces, and various pickled foods.

Your body needs a certain amount of sodium to function. For example, it helps support your blood pressure. This sodium usually comes from [salt](#). However, eating too much salt is linked to an increased risk of stroke and heart disease [\[R\]](#), [\[R\]](#).

Foods higher in salt include [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Prepared soups, broths, gravies, and sauces
- Fermented or pickled foods (such as pickles, soy sauce, olives, and [capers](#))
- Cured meats and sausages (such as bacon, salt pork, and salami)
- Cheese (such as Roquefort and Parmesan)

Try to limit your daily intake to 1 teaspoon of salt (2,400 mg of sodium) [\[R\]](#).

How it helps

A meta-analysis of 11 studies and 39,065 people found that high sodium intake increases the risk of osteoporosis by 20%. However, there was no relationship between sodium intake and bone mineral density, and the authors warned about the high heterogeneity of the studies [\[R\]](#).

High salt consumption can increase calcium loss from the body, potentially weakening the bones.

40



Magnesium

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take up to 350 mg of magnesium daily as a supplement, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

250 mg

Description

Magnesium is an essential mineral involved in various bodily functions, including muscle contractions, nerve signaling, and bone health. Maintaining adequate magnesium levels through diet or supplements can support overall well-being and reduce the risk of magnesium deficiency-related health issues.

[Magnesium](#) is an essential mineral. Your body needs it for [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Muscle, nerve, and bone function
- Blood sugar and blood pressure control
- DNA and protein production
- Strong immunity

Women need **310-320 mg** of magnesium per day, while men need **400-420 mg** [\[R\]](#).

Foods rich in magnesium include **nuts, seeds, and leafy greens**. Magnesium is also available as a supplement [\[R\]](#).

How it helps

Low magnesium intake is linked to lower bone mineral density [\[R\]](#), [\[R\]](#).

Supplementing with magnesium (up to 350 mg/day for less than 4 weeks) may support bone health. It may help by reducing bone loss [\[R\]](#), [\[R\]](#), [\[R\]](#).

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Lactoferrin

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take 100-200 mg of lactoferrin supplement per day, preferably on an empty stomach to enhance its absorption. Continue this regimen daily for 8 to 12 weeks to observe beneficial effects.

TYPICAL STARTING DOSE

100 mg

Description

Lactoferrin is a protein found in milk and other bodily fluids that has been studied for its potential health benefits, including immune system support and antimicrobial properties. It plays a role in promoting gut health.

Lactoferrin is a protein found in milk. It can bind to iron and travel all around the body [R].

Lactoferrin may help support [R, R]:

- Immunity
- Iron status

How it helps

Lactoferrin, a protein found in cow milk and human milk, can help improve bone health by promoting bone growth and increasing calcium absorption in the body. This can be beneficial for conditions like osteoporosis, where bone density and strength are compromised.

A [systematic review of 5 studies with metanalysis and metaregression](#) found that lactoferrin, both systemically and locally, **increases the growth of a newly formed bone (2.58), shortens the time of graft resorption (- 1.70), and replaces it with a species-specific bone** when implemented in oral surgery [R].

In a [randomized clinical trial with 38 healthy, postmenopausal women](#), ribonuclease-enriched lactoferrin supplement **reduced bone resorption and increased osteoblastic bone formation**. It **decreased urine deoxypyridinoline by 14%** (19% increase for placebo) and **serum N-telopeptides maintained at 24%** of the baseline (41% for placebo), while increasing bone-specific alkaline phosphatase and osteocalcin levels by 45% and 16% elevation (25% and 5% for placebo) [R].

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Soy Protein

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Include 20 grams of soy protein in your daily diet. This can be achieved by consuming soy-based products such as tofu, soy milk, or soy nuts throughout the day.

TYPICAL STARTING DOSE

20 g

Description

Soy protein is a high-quality plant-based protein derived from soybeans. It is commonly used in vegetarian and vegan diets and may support muscle growth, weight management, and overall nutritional needs.

Soy is a common food in many cuisines around the world, especially Asian cuisines [\[R\]](#).

It’s a great source of [\[R\]](#), [\[R\]](#):

- Plant-based protein
- Fiber
- Omega-3 fats
- Antioxidants (isoflavones)

Soy-based foods include [\[R\]](#):

- Tofu
- Tempeh
- Edamame
- Miso
- Natto

Soy protein and soy isoflavones are also available as supplements.

How it helps

A meta-analysis of 7 trials and 633 healthy women concluded that soy and animal protein are equally beneficial for maintaining bone health [\[R\]](#).

Adequate protein intake is essential for bone matrix formation and maintenance [\[R\]](#).

43



Genistein

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Take a genistein supplement daily, with a usual dosage range between 30 mg to 100 mg. It is best taken with food to enhance absorption. Continue this regimen daily for at least six months to evaluate its benefits fully.

TYPICAL STARTING DOSE

30 mg

Description

Genistein is an isoflavone found in soy products that may offer potential health benefits, including antioxidant and anti-inflammatory properties. It has been studied for its potential role in hormone regulation and the reduction of certain cancer risks.

How it helps

In a study with 389 osteopenic postmenopausal women, those who took 54 mg of genistein daily for 24 months, along with calcium and vitamin D, showed positive effects on bone mineral density [R].

In a study with 200 postmenopausal women on prednisone, both genistein and alendronate reduced C-terminal telopeptide, while genistein had greater effects on osteocalcin, bone-ALP, and sclerostin [R].

Another study aimed to assess the impact of daily genistein (54 mg) on 138 osteopenic postmenopausal women found that genistein significantly improved bone mineral density in the femur and lumbar spine [R].

A study on 90 healthy women with low femoral neck BMD showed that genistein reduced bone resorption and increased bone formation in postmenopausal women [R].

However, two studies showed no association of soy isoflavones with biomarkers of bone health [R, R].

Genistein may help by mimicking estrogen, a hormone crucial for bone maintenance.

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Yoga

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Practice yoga for at least 20 to 30 minutes a day, most days of the week. Choose a style that matches your fitness level and goals, and consider attending a class or using online resources to guide your practice.

TYPICAL STARTING DOSE

30 minutes

Description

Yoga is a mind-body practice that combines physical postures, breathing exercises, and meditation. It enhances flexibility, strength, and mental well-being and is used for stress reduction, relaxation, and overall health improvement.

[Yoga](#) combines breathing, stretching, and relaxation techniques. Practicing yoga may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Reduce [stress](#)
- Improve fitness
- Lower blood pressure and heart rate
- Manage pain

How it helps

A meta-analysis of 11 trials and 591 participants concluded that yoga may slightly help preserve bone mineral density in postmenopausal women [\[R\]](#).

In 3 trials on postmenopausal women with osteoporosis, yoga helped improve balance, physical and social function, pain, sleep, and quality of life [\[R\]](#), [\[R\]](#), [\[R\]](#).

Yoga can increase bone density and improve balance, reducing the risk of falls that lead to fractures.

45



Gentle Yoga

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Practice yoga for at least 20 to 30 minutes a day, most days of the week. Choose a style that matches your fitness level and goals, and consider attending a class or using online resources to guide your practice.

TYPICAL STARTING DOSE

20 minutes

Description

[Yoga](#) combines breathing, stretching, and relaxation techniques. Practicing yoga may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Reduce [stress](#)
- Improve fitness
- Lower blood pressure and heart rate
- Manage pain

Gentle yoga is practiced at a slower pace, with less intense positions, and usually including more time for meditation, breathing, and relaxation. It's a great choice for people who feel they are not fit or flexible enough to do all yoga poses, as well as for those with injuries, pain, impaired mobility, or health issues.

How it helps

A meta-analysis of 11 trials and 591 participants concluded that yoga may slightly help preserve bone mineral density in postmenopausal women [\[R\]](#).

In 3 trials on postmenopausal women with osteoporosis, yoga helped improve balance, physical and social function, pain, sleep, and quality of life [\[R\]](#), [\[R\]](#), [\[R\]](#).

In adolescent girls with anorexia, gentle yoga may increase BMD while improving mental health [\[R\]](#).

Yoga can increase bone density and improve balance, reducing the risk of falls that lead to fractures.

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Dietary Vitamin E

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Incorporate foods high in Vitamin E into your daily diet. This includes almonds, hazelnuts, sunflower seeds, and green leafy vegetables such as spinach and broccoli. Aim for a daily intake of 15mg of Vitamin E from your diet, which is roughly a handful of almonds (about 23 almonds) or 2 tablespoons of sunflower seeds.

Description

Dietary vitamin E is a fat-soluble antioxidant vitamin found in nuts, seeds, and vegetable oils. It helps protect cells from oxidative damage and supports immune function.

[Vitamin E](#) is an antioxidant important for the immune system and for heart health [\[R\]](#).

Plant-based foods have the most vitamin E. These include [\[R\]](#):

- Wheat germ
- Sunflower seeds
- Almonds
- Plant oils

Adults need about **15 mg** of vitamin E per day [\[R\]](#).

How it helps

Genetically higher levels of vitamin E may be associated with higher bone mineral density (>10% per 1-SD increase) [\[R\]](#).

In line with this, a study of 3,203 adults associated greater intake and blood levels of vitamin E with higher bone mineral density. In contrast, low blood vitamin E levels were associated with osteoporosis in a study of 232 postmenopausal women [\[R\]](#), [\[R\]](#).

A meta-analysis of 13 studies and 384,464 participants found that increased intake of vitamin E reduces the risk of bone fractures by 51.5%. Vitamin E (and other antioxidant vitamins) was more effective in men [\[R\]](#).

In a placebo-controlled trial of 89 postmenopausal women with osteopenia, supplementation with the vitamin E form tocotrienol (430-860 mg/day) for 12 weeks decreased bone resorption and improved bone turnover rate. Tocotrienol significantly reduced blood sRANKL levels and sRANKL/OPG ratio, and urine NTX and 8-OHdG levels, marginally decreased blood BALP levels, and significantly increased blood BALP/NTX ratio. Doses of up to 600 mg/day were safe in terms of kidney and liver function, and didn't affect body composition, physical activity, quality of life, or nutrient intake [\[R\]](#), [\[R\]](#).

In contrast, supplementation with alpha-tocopherol may have the opposite effects. Two studies of 1486 people associated high blood levels and intake of alpha-tocopherol with lower bone mineral density and levels of a bone formation marker (BALP). Similarly, a placebo-controlled trial of 35 elderly men found that high doses of alpha-tocopherol (235 mg/day) and vitamin C reduced the beneficial effects of 12-week resistance exercise on bone mineral density [\[R\]](#), [\[R\]](#), [\[R\]](#).

Vitamin E may promote bone formation and fracture healing while preventing bone loss through its antioxidant and anti-inflammatory effects [\[R\]](#), [\[R\]](#).

47



Tai Chi

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

Practice Tai Chi for 30 to 60 minutes at least twice a week. Choose a quiet, spacious area and follow along with a qualified instructor, either in person at a class or through an online video tutorial, to ensure proper technique and maximum benefit.

TYPICAL STARTING DOSE

1 hour

Description

Tai Chi is a traditional Chinese mind-body practice involving slow, flowing movements and deep breathing. It is known for its potential to reduce stress, improve balance, and enhance overall physical and mental well-being.

Tai chi involves gentle movements and breathing to strengthen and relax the mind and body. Practicing tai chi may help [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Manage pain
- Improve fitness
- Increase well-being
- Improve sleep and mood

How it helps

A meta-analysis of 11 trials found that tai chi had similar beneficial effects on bone health than exercise interventions. However, the authors warned about the poor, weak, and inconsistent nature of the evidence [\[R\]](#).

48



Dietary Omega-3 Fatty Acids

IMPACT2 / 5

EVIDENCE2 / 5

How to implement

Incorporate foods high in omega-3 fatty acids into your diet daily. This includes eating fish such as salmon, mackerel, and sardines at least twice a week. Alternatively, include a tablespoon of flaxseed oil or chia seeds in your daily diet.

Description

[Omega-3 fatty acids](#) are some of the healthiest fats we can eat. They help lower inflammation and protect the heart, brain, and eyes. Our bodies produce less omega-3s than we need for optimal health, so it's important to get enough through food or supplements [\[R\]](#), [\[R\]](#), [\[R\]](#).

There are three major types of omega-3s: ALA, EPA, and DHA. **EPA and DHA are vital for mental and heart health** [\[R\]](#), [\[R\]](#), [\[R\]](#).

Fatty fish are rich in EPA and DHA. They include [\[R\]](#):

- Salmon
- Tuna
- Herring
- Sardines

For optimal health, try to get at least **two servings of fatty fish per week**. Fish oil supplements are available for those who don't eat fish regularly [\[R\]](#).

How it helps

Getting more omega-3s from food or supplements may improve bone health. It may decrease bone loss and the risk of hip fractures [\[R\]](#), [\[R\]](#), [\[R\]](#).

However, the evidence for omega-3 supplements is mixed. They may work better in combination with calcium [\[R\]](#).

Omega-3s may promote bone health by reducing inflammation [\[R\]](#).

Please note: *Fish oil can interact with blood thinners (like aspirin, Plavix, Coumadin). Consult your doctor before taking fish oil* [\[R\]](#).

49



Chicory

IMPACT2 / 5

EVIDENCE2 / 5

Description

Chicory is a nutrient-rich vegetable that has been shown to have a number of health benefits. It is a good source of fiber, vitamin K, and antioxidants. Chicory may also help to improve digestion, lower blood sugar levels, and boost the immune system.

How it helps

A study on 15 postmenopausal women tested the effect of chicory-derived SYN1 on calcium and magnesium absorption, as well as bone turnover markers. SYN1 supplementation for 6 weeks increased mineral absorption and influenced bone turnover, especially in women with lower spine bone mineral density [\[R\]](#).

50



Avoid PAHs Exposure

IMPACT2 / 5

EVIDENCE2 / 5

How to implement

Minimize your exposure to Polycyclic Aromatic Hydrocarbons (PAHs) by avoiding or reducing consumption of charred, grilled, or smoked foods, not smoking or avoiding secondhand smoke, and limiting time spent in areas with heavy traffic or industrial fumes. Use exhaust fans in kitchens and ensure proper ventilation when cooking at high temperatures to reduce indoor levels of PAHs.

Description

PAHs or Polycyclic Aromatic Hydrocarbons are harmful substances found in smoke and grilled foods. Try to limit exposure to them for better health. For example, avoid inhaling smoke from cigarettes or barbeques and choose alternative cooking techniques over grilling. Minimizing PAHs can reduce the risk of several health issues, particularly lung and skin diseases.

How it helps

A study of 3053 individuals aged 50 years or older associated 2-hydroxyfluorene levels with 87-157% higher risk of osteoporosis, while 3-hydroxyfluorene decreased the risk [\[R\]](#).

Another study (1408 participants) associated all PAH metabolites except 3-phenanthrene with increased bone turnover (higher N-telopeptide levels) [\[R\]](#).

A study of 1903 women associated 1-Hydroxynapthalene, 2-Hydroxyfluorene, 3-Hydroxyphenanthrene, 2-Hydroxyphenanthrene, and 9-Hydroxyfluorene with decreased BMD and 86% higher risk of osteoporosis [\[R\]](#).

A study of 2978 participants associated high 3-fluorene and 2-fluorene with greater left arm BMD, while 2-phenanthrene was associated with decreased left and right arm BMD, and total BMD [\[R\]](#).

PAHs can disrupt the balance of bone remodeling, leading to bone loss.

51



Vitamin B12

IMPACT2 / 5

EVIDENCE1 / 5

How to implement

Take a 50 mcg vitamin B12 supplement daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

100 mcg

Description

Vitamin B12 is a water-soluble vitamin primarily found in animal-based foods like meat, fish, and dairy products. It plays a crucial role in maintaining healthy nerve cells, DNA synthesis, and red blood cell formation. Vitamin B12 deficiency can lead to anemia, neurological issues, and fatigue.

[Vitamin B12](#) is important for [\[R\]](#), [\[R\]](#):

- Building DNA
- Nervous system function
- Energy production

You can get vitamin B12 from [\[R\]](#):

- Animal products (meat, fish, eggs, and dairy)
- Fortified foods
- Supplements

Adults should be getting **2.4 micrograms** of vitamin B12 every day [\[R\]](#).

How it helps

A [meta-analysis of 27 studies and 7475 participants](#) found that **every 50 pmol/L increase in vitamin B12 levels lowers the risk of bone fractures by 4%** [\[R\]](#).

However, a [meta-analysis of 28 studies](#) **only associated folate (but not vitamin B12) deficiency with fracture risk** and found that **supplementation with combined B vitamins failed to reduce it** [\[R\]](#).

In a [placebo-controlled trial of 167 patients with low vitamin B12 status](#), supplementation with a multi-vitamin complex containing folic acid (200 µg), vitamin B12 (10 µg), vitamin B6 (10 mg), and riboflavin (5 mg) for 2 years **reduced BMD decline** [\[R\]](#).

 PERSONALIZED TO YOUR GENES

People with your [MTHFR](#) gene variant may have lower BMD and increased risk of fractures if their vitamin B12 intake is low [\[R\]](#).

YOUR GENETIC VARIANTS			
GENE	SNP	GENOTYPE	EVIDENCE
MTHFR	rs1801133	AA	

52



Kefir

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Incorporate kefir into your daily diet by drinking approximately 1-2 cups (240-480 ml) per day. It can be consumed on its own, blended into smoothies, or used as a base for salad dressings or soups. Continuous consumption over several weeks is recommended to observe its health benefits.

Description

Kefir is a fermented dairy product packed with probiotics, which can promote gut health and support digestion. Regular consumption of kefir is associated with improved digestive function and may enhance the immune system.

How it helps

Kefir is rich in calcium and vitamin K2, nutrients essential for bone health. These nutrients help in increasing bone density, reducing the risk of fractures, and slowing down the progression of osteoporosis.

In a non-placebo-controlled trial of 40 patients with osteoporosis, kefir-fermented milk (1,600 mg for 6 months) supplemented with calcium bicarbonate (1,500 mg) for 6 months improved hip BMD, decreased the serum β C-terminal telopeptide of type I collagen (β -CTX), and increased serum osteocalcin and PTH [\[R\]](#).

53



Lycopene

IMPACT2 / 5

EVIDENCE1 / 5

How to implement

Take a lycopene supplement of 10 to 30 mg per day. It can be consumed with a fat-containing meal to enhance absorption. This supplementation can be ongoing daily to support overall health benefits such as heart health and antioxidant protection.

TYPICAL STARTING DOSE

10 mg

Description

Lycopene is a powerful antioxidant found in tomatoes and other red or pink fruits and vegetables. Consuming lycopene-rich foods may help reduce the risk of chronic diseases and support heart and prostate health.

[Lycopene](#) is a bright red substance that gives color to a number of fruits such as [R](#), [R](#):

- Tomato
- Watermelon
- Papaya
- Apricot

Lycopene has antioxidant properties. It may help support [R](#), [R](#), [R](#):

- Heart health
- Prostate health
- Cognition

How it helps

Lycopene, an antioxidant found in tomatoes, contributes to bone health by neutralizing harmful free radicals that can damage bone cells. Regular intake of lycopene can thus help slow down osteoporosis and bone aging.

In a study with 60 postmenopausal women aged 50-60, lycopene consumption, either from tomato juice or capsules, reduced oxidative stress and the bone resorption marker NTx over 4 months [R](#).

54



DHEA (Dehydroepiandrosterone)

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Take 25-50 mg of DHEA orally with water daily, preferably in the morning to mimic the body's natural rhythm of DHEA production. It is advisable to start at the lower dose to assess tolerance and adjust as needed. Consult a healthcare provider for personalized advice and before starting a new supplement regimen.

TYPICAL STARTING DOSE

25 mg

Description

DHEA is a hormone produced by the adrenal glands and has been used as a dietary supplement for various purposes, including supporting hormonal balance and energy levels. It may have potential benefits for specific individuals, but its use should be supervised by a healthcare professional due to its hormonal nature.

DHEA is a steroid hormone produced primarily by the adrenal glands. It is also produced to a much lesser extent by the testes and ovaries and, possibly, the brain [\[R, R\]](#).

DHEA helps make the sex hormones [testosterone](#) and [estrogen](#). DHEA is important for [\[R, R, R, R\]](#):

- Mood
- Immunity
- Muscle strength
- Bone health
- Skin health

DHEA is released in response to stress. In fact, one of DHEA's important roles is to protect against the adverse effects of prolonged and excessive exposure to cortisol, the stress hormone [\[R, R, R\]](#).

How it helps

A meta-analysis of 3 randomized trials and 289 healthy adults found that DHEA supplementation increased hip and trochanter BMD. However, a more recent meta-analysis of 15 studies found that DHEA monotherapy doesn't improve BMD. Nevertheless, two Mendelian randomization studies associated genetically higher DHEA levels with increased BMD at the lumbar spine and heel [\[R, R, R, R\]](#).

DHEA may help by promoting the production of new bone cells.

Please note: *DHEA has been banned by sport associations and anti-doping agencies. DHEA should not be used at high doses or long-term and is contraindicated in patients with hormone-responsive cancers. DHEA supplements should only be used with the prescription of a medical professional. Discuss risks and side effects with your doctor* [\[R\]](#).

55



Greek Yogurt

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Incorporate Greek yogurt into your diet by eating at least one serving (about 6 ounces or 170 grams) daily. You can enjoy it as a breakfast item, a healthy snack, mixed with fruits and nuts, or as a substitute for sour cream in recipes.

Description

Greek yogurt is a protein-rich dairy product that provides essential nutrients like calcium and probiotics for gut health. It's a nutritious addition to the diet that can support digestion and overall nutritional well-being.

How it helps

Greek yogurt is high in calcium and protein, both of which are essential for maintaining bone health. Regular consumption can help prevent conditions such as osteoporosis by increasing bone density.

Thirty untrained, university-aged, males were randomized to 2 groups (n = 15/group): GY (20 g protein, 208 mg calcium/dose) or placebo pudding consumed 3×/day on training days and 2×/day on non training days. Greek yogurt, with exercise, increased bone formation in young adult males over 12 weeks. After 1 week of an osteogenic exercise program, Greek yogurt tended to blunt a rise in bone resorption seen with the placebo [\[R\]](#).

Adding three servings of yogurt to the daily diet of older women with habitually low calcium intakes resulted in a significant reduction in urinary excretion of N-telepeptide, a marker for bone resorption. Results were compared to the effects of three servings of a nutrition-poor snack and differences were apparent 7-10 days of starting the diet change [\[R\]](#).

56



Tomato

IMPACT

2 / 5

EVIDENCE

1 / 5

How to implement

Incorporate fresh or cooked tomatoes into your daily diet. This can be achieved by adding them to salads, sandwiches, pastas, and sauces or simply eating them on their own. Aim for at least one serving (approximately 1 medium-sized tomato or 1/2 cup of chopped or cooked tomatoes) per day.

Description

Tomatoes are a fruit grown widely in numerous varieties, and are rich in vitamins C and K, as well as the antioxidant lycopene, which may contribute to heart health and protect against certain chronic diseases when incorporated into a balanced diet.

Tomato (*Solanum lycopersicum*) is a fruit originally from the Andes in South America. It is usually consumed as a vegetable in juices, sauces, or fresh. Tomato is an important source of [R]:

- [Vitamin C](#)
- Potassium
- Antioxidants (e.g., [lycopene](#))
- Vitamin B9 ([folate](#))

Tomato is traditionally used for [R, R]:

- High cholesterol
- High blood pressure

How it helps

Tomatoes are rich in vitamin K and calcium which are essential for strengthening and repairing bones. Lycopene, an antioxidant found in tomatoes, has also been linked to improved bone density.

In a [non-placebo-controlled trial of 39 postmenopausal women](#), consuming a lycopene-rich tomato sauce (150 mL/day) for 3 months **prevented bone loss and reduced bone alkaline phosphatase** [R].

How to implement

Description

Prunes are a good source of omega-6 fatty acids, vitamin A and B6, potassium, iron, magnesium, and copper. A ½ cup serving provides 635 mcg or 14%DV.

How it helps

Prunes are rich in nutrients like vitamin K and manganese, which are essential for the maintenance of strong, healthy bones. In addition, they contain phenolic compounds that may inhibit bone resorption.

How to implement

Description

How it helps

Lead can be stored in the bones, where it competes with calcium.

59



White Kwao Krua (Pueraria Mirifica)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a Pueraria mirifica supplement, commonly known as white kwao krua, once daily, with dosages typically ranging from 10 to 100 mg. It is best to start with the lowest dose to assess your body's response before possibly increasing the amount under medical supervision. The duration of use should be as advised by a healthcare professional, considering the specific health goals or conditions being targeted.

TYPICAL STARTING DOSE

10 mg

Description

White Kwao Krua, also called Pueraria Mirifica, is a plant found in Thailand known for its health benefits. It’s usually used as a supplement that can help balance hormones, improve skin health, and may have benefits for bone health. By taking this supplement, it can positively enhance your overall health and well-being.

How it helps

White Kwao Krua, or Pueraria Mirifica, is thought to enhance bone health by promoting the production of cells that build bone (osteoblasts). This can help reduce bone loss and potentially increase bone density, an important factor in overall bone strength.

In a placebo-controlled trial of 71 postmenopausal women, supplementation with pueraria (20-50 mg/day) for 24 weeks decreased bone-specific alkaline phosphatase levels (by 0.09 U/L) [\[R\]](#).

60



Royal Jelly

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a royal jelly supplement daily, starting with a dose of approximately 300 mg to 500 mg. It can be consumed either in capsule form or directly, depending on your preference, for a period ranging from 3 to 6 months to observe the potential health benefits.

TYPICAL STARTING DOSE

300 mg

Description

Royal jelly is a nutrient-rich substance secreted by worker bees to feed bee larvae and the queen bee. Royal jelly contains protein B-vitamins, calcium and iron. It is taken as a supplement for it's potential energy-boosting and immune-supporting properties.

How it helps

Royal jelly is rich in proteins, vitamins, and minerals like calcium that are crucial for maintaining bone health. Its anti-inflammatory and antioxidant properties can contribute to reducing bone loss and promoting bone healing.

In a [placebo-controlled trial of 72 postmenopausal women](#), supplementation with royal jelly (3000 mg/day) for 6 months **attenuated decreases in femoral BMD and strength** [\[R\]](#).

61



Red Clover

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a red clover supplement in the form of capsules, typically ranging from 40 to 80 milligrams daily. This should be done under the guidance of a healthcare provider, especially if you're using it for menopausal symptoms or bone health, to ensure it's appropriate for your individual needs. Generally, it's used for periods ranging from 3 to 12 months.

TYPICAL STARTING DOSE

40 mg

Description

Red Clover is a plant that's often utilized for its health benefits. Not just pleasing to the eyes with its bright color, it's known to help with skin health and menopause symptoms. Additionally, it may improve heart health and bone density. It's like a power-plant, offering multiple health benefits in one package.

How it helps

In a placebo-controlled trial of 205 postmenopausal women, supplementation with red clover for 12 months decreased the loss of BMD in the lumbar spine, but not in the hip, while increasing bone formation markers [\[R\]](#).

62



Melatonin

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take 500 mcg of melatonin orally, about 30 minutes before bedtime, to help with sleep. It can be taken daily as needed.

TYPICAL STARTING DOSE

500 mcg

Description

Melatonin is a natural hormone produced by the pineal gland in the brain that helps regulate the sleep-wake cycle. It plays a crucial role in promoting sleep onset and maintaining a consistent sleep pattern, making it a commonly used supplement for managing sleep disorders and jet lag.

[Melatonin](#) is an important sleep hormone. Bright light at night may prevent your body from making enough melatonin [\[R\]](#), [\[R\]](#), [\[R\]](#).

Your body makes melatonin on its own. However, some people take melatonin supplements to help them sleep. It may help with jet lag in particular [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

In a placebo-controlled trial of 18 perimenopausal women, supplementation with melatonin (3 mg/day) for 6 months slightly restored imbalances in bone remodelling (by reducing the NTX to osteocalcin ratio) [\[R\]](#).

In another placebo-controlled trial of 81 postmenopausal osteopenic women, supplementation with 1 mg/day melatonin for 1 year increased femoral neck density by 0.5%, while a dose of 3 mg/day increased it by 2.3%. Moreover, 3 mg/day increased trabecular thickness in the tibia by 2.2% and volumetric bone mineral density in the spine by 3.6% while reducing urinary calcium by 12.2% [\[R\]](#).

Melatonin may help by stimulating the growth and activity of osteoblasts, the cells that form new bone.

63



Tocotrienols

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take tocotrienols as a dietary supplement in doses ranging from 100 to 200 mg, 1-2 times a day, ideally with meals to enhance absorption. This intake can be continuous, but it's recommended to review its effects with a healthcare provider periodically, typically every 6 to 12 months.

TYPICAL STARTING DOSE
100 mg

Description

Tocotrienols are a form of vitamin E that helps to protect your cells. They fight harmful substances in your body called free radicals, which can damage our cells and lead to illness. By helping your body in this way, tocotrienols contribute to overall health, boosting immunity, and slowing down aging processes.

How it helps

In a placebo-controlled trial of 87 postmenopausal women with osteopenia, supplementation with tocotrienol for 12 weeks suppressed bone resorption and bone remodeling. It marginally decreased bone markers such as serum bone-specific alkaline phosphatase (BALP), urine N-terminal telopeptide (NTX), serum soluble receptor activator of nuclear factor-kappaB ligand (sRANKL), sRANKL/serum osteoprotegerin (OPG) ratio, and urine 8-OHdG concentrations, and significantly increased BALP/NTX ratio [R].

Tocotrienols may help by promoting bone formation and reducing bone resorption.

64



Gamma-Linolenic Acid (GLA) And EPA

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a supplement containing both gamma-linolenic acid (GLA) and eicosapentaenoic acid (EPA) daily. The dosage typically used in studies ranges from 1 to 3 grams of EPA combined with around 150 to 300 milligrams of GLA. This supplement should be taken with food to enhance absorption and minimize potential gastrointestinal discomfort.

TYPICAL STARTING DOSE
1 g

Description

GLA is an omega-6 fatty acid found in certain plant oils, such as evening primrose oil and borage oil. It may have anti-inflammatory properties and can potentially benefit skin health, hormonal balance, and overall well-being. An **EPA/DHA supplement** can be taken to help meet omega-3 fatty acid needs not achieved through diet. Supplement amounts are generally 250-500mg/d though there are no current official recommendations other than for ALA.

How it helps

GLA and EPA supplementation can promote bone health by reducing inflammation and enhancing calcium absorption in your body. This may lead to improved bone density, thereby preventing osteoporosis and other bone-related conditions.

A 36-month pilot study with 65 elderly women (mean age 79.5) on a low calcium diet found GLA + EPA, along with calcium, showed positive effects on bone health [R].

65



Olive Leaf Extract

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take 500-1000 mg of olive leaf extract daily, ideally in divided doses with meals. This regimen should be followed for at least 8 weeks to assess its effects on your health.

TYPICAL STARTING DOSE
500 mg

Description

Olive leaf extract is derived from the leaves of the olive tree and contains bioactive compounds such as oleuropein. It is believed to have various health benefits, including antioxidant and anti-inflammatory properties that may contribute to improved immune function and overall well-being.

How it helps

In a placebo-controlled trial of 64 patients with osteopenia, supplementation with olive extract (250 mg/day) and calcium (1000 mg/day) for 12 months increased osteocalcin levels, maintained BMD, and decreased total and LDL cholesterol [\[R\]](#).

Olive leaf extract is rich in antioxidants and anti-inflammatory compounds that may help preserve bone density and protect against bone loss.

66



Dietary Beta-Carotene

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate foods rich in beta-carotene into your diet daily. These include carrots, sweet potatoes, spinach, kale, and cantaloupe. Aim for at least one serving of these vegetables or fruits at each meal to ensure an adequate intake of beta-carotene.

Description

Beta-carotene is a type of dietary antioxidant and a precursor to vitamin A. It supports healthy vision, skin, and immune function, and may reduce the risk of certain diseases.

[Beta-carotene](#) is a plant-derived golden-yellow carotenoid pigment. In addition to its antioxidant activity, **beta-carotene is converted to vitamin A in the body**. Beta-carotene **contributes about 30-35% of the dietary intake of this vitamin** in western countries. In developing countries, it represents the most abundant, and sometimes the sole source of vitamin A [\[R\]](#), [\[R\]](#), [\[R\]](#)

Good sources of beta-carotene include [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Fruits (apricots, peaches, persimmons, melons, citrus, tomatoes, etc.)
- Green vegetables (spinach, broccoli, parsley, collard greens)
- Orange tuber vegetables (carrots, sweet potatoes)

How it helps

In a study of 15 people, β -carotene intake showed no overall risk association with osteoporosis. However, a negative association was found in Asians. The same pattern was observed for BMD [\[R\]](#).

A meta-analysis of 9 studies found there was a 95% probability that β -carotene intake reduces the risk of hip fracture and any type of fracture by more than 20%. Stronger effects were observed in Asians and women [\[R\]](#).

Beta-carotene converts to vitamin A in the body, which aids in the formation and maintenance of healthy bones.

Please note: *While dietary beta-carotene is generally considered safe, beta-carotene supplements have been linked to heart disease and cancer, especially lung cancer. These links may be stronger in smokers. Make sure to consult your doctor before taking beta-carotene supplements* [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

67



Lactobacillus Reuteri

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take a supplement containing Lactobacillus reuteri daily, ideally choosing a product that specifies CFU (colony-forming units) to ensure you receive an effective dose. Dosage can vary depending on the specific product, but it's typically around 10 billion CFUs. Continue taking the supplement for at least 4 to 8 weeks to evaluate its benefits for your gut health.

TYPICAL STARTING DOSE
10 billion CFU

Description

Lactobacillus reuteri is a beneficial probiotic strain that can support digestive health and contribute to a balanced gut microbiome. It may help improve gut function, enhance nutrient absorption, and bolster the immune system, promoting overall well-being.

[Lactobacillus reuteri](#) is a [probiotic](#) bacterium that is part of the normal [microbiome](#) of the gut, skin, urinary tract, and, occasionally, the stomach [\[R\]](#).

L. reuteri is also used as a probiotic. People take it to help with [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- High cholesterol
- Gut diseases
- Constipation
- Helicobacter pylori infections

In the 1960s, **30-40 percent** of people had *Lactobacillus reuteri* as a part of their microbiome. Today, estimates suggest it is found in only **10-20 percent** [\[R\]](#), [\[R\]](#).

How it helps

Lactobacillus Reuteri promotes the absorption of calcium, essential to bone health, in the intestines. Additionally, it triggers an immune response that can potentially slow bone loss and improve overall bone density.

RCT, placebo: In this double-blind, placebo-controlled study, women from the population who were 75 to 80 years old and had low BMD were randomized to orally receive **10^10 colony-forming units of L. reuteri 6475** daily or placebo. Ninety women were included and 70 completed the study. L. reuteri 6475 **reduced loss of total vBMD** compared to placebo [\[R\]](#).

68



Collagen Peptides

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 10-20 grams of collagen peptides daily, mixing the powder into a glass of water, juice, or a smoothie. It is recommended to consume this supplement on an empty stomach to improve absorption, ideally first thing in the morning or right before bedtime for a period of at least 8-12 weeks to observe beneficial effects.

TYPICAL STARTING DOSE

10 g

Description

Collagen peptides are a form of collagen that is broken down into smaller, more easily absorbed molecules. They are commonly used in supplements and skincare products for their potential to promote skin elasticity, hair strength, and nail health.

[Collagen](#) is a protein that helps build skin, bones, and joints [\[R\]](#), [\[R\]](#).

People use collagen supplements for [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Joint pain
- Skin health
- Hair growth

How it helps

Collagen peptides promote bone health by increasing bone mineral density and supporting bone structure. Their intake stimulates cells to produce more collagen, which strengthens bones, reducing the risk of fractures.

In a study with 102 postmenopausal women, those who took SCP (strontium citrate and parathyroid hormone) saw significant increases in spine and femoral neck bone density (BMD) compared to the control group. SCP also led to favorable changes in bone markers, suggesting increased bone formation and reduced degradation [\[R\]](#).

69

Avoid Air Pollution

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Stay indoors on days when air quality indexes (AQI) indicate high pollution levels, which are often reported by weather services or government environmental agencies. **Install air purifiers** in your home, especially in bedrooms, to reduce indoor pollutants. Limit outdoor exercise when air pollution warnings are issued, opting for indoor activities instead.

Description

Avoiding air pollution by reducing exposure to pollutants in the environment is essential for respiratory and overall health. It can help lower the risk of respiratory diseases, cardiovascular conditions, and other health issues associated with poor air quality.

While city life is convenient in a lot of ways, it comes with some health hazards. Cars, factories, and other sources increase air [pollution](#) [R].

Air pollution plays a role in [R](#), [R](#), [R](#), [R](#), [R](#):

- Lung disease
- Heart disease
- Diabetes
- Asthma
- Skin conditions

How it helps

A systematic review of 19 studies found outdoor air pollutants like PM10, PM2.5, and nitrogen dioxide may increase the risk of osteoporotic fracture and osteoporosis, but evidence quality varies [\[R\]](#).

A meta-analysis of 9 studies (9,371,212 patients) linked air pollution (PM2.5 and NO2) to increased osteoporosis risk (hip fracture and total body BMD), but not PM10, NO, or O3 [\[R\]](#).

Air pollutants can accelerate bone loss and increase the risk of fractures.

70



Extra Virgin Olive Oil (EVOO)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate 1-2 tablespoons of extra virgin olive oil into your daily diet. Use it as a dressing for salads, vegetables, or incorporate it into cooking, but avoid using it at high temperatures to preserve its health benefits.

Description

Extra virgin olive oil is a high-quality olive oil obtained from the first pressing of olives. It is rich in monounsaturated fats and antioxidants, like polyphenols, and is associated with various health benefits, including heart health and anti-inflammatory properties.

[Olive oil](#) is fat from the olive, a traditional tree of the Mediterranean Basin [\[R\]](#).

Olive oil has anti-inflammatory and antioxidant properties. It may also reduce the risk of [\[R\]](#), [\[R\]](#):

- Heart disease
- Diabetes
- Cancer

Olive oil is also the primary fat source in the [Mediterranean diet](#), which may improve brain and heart health [\[R\]](#).

How it helps

Extra Virgin Olive Oil (EVOO) is beneficial for bone health as it contains phenolic compounds that can stimulate bone formation and inhibit bone resorption. This helps to increase bone density and reduce the risk of osteoporosis.

In a [non-placebo-controlled trial of 870 participants](#) followed up for 8.9 years on average, those in the highest tertile of EVOO consumption **halved their risk of fractures** [\[R\]](#).

In a [non-placebo-controlled trial of 127 men at high cardiovascular risk](#), consuming a Mediterranean diet enriched in EVOO for 2 years **increased osteocalcin concentration** [\[R\]](#).

71



Avoid Arsenic Exposure

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Use a water filter certified to remove arsenic if you rely on well water, opt for arsenic-tested rice or rice products, and avoid using contaminated pesticides or herbicides in gardening or farming. Test your home for arsenic if you live in an area known for high levels of arsenic in soil or water. Limit consumption of foods known to accumulate arsenic such as rice and rice-based products, especially if you are pregnant, nursing, or preparing meals for young children.

Description

Avoiding arsenic exposure is essential for preventing potential health risks associated with arsenic contamination in drinking water and foods. Chronic exposure to arsenic has been linked to various health issues, including cancer and cardiovascular problems.

Arsenic is a [heavy metal](#) naturally found in the environment. It is used for mining, fracking, and industrial applications, such as the production of pesticides and wood preservatives, and the use of fossil fuels [\[R\]](#).

The main sources of exposure to arsenic are contaminated [\[R\]](#), [\[R\]](#), [\[R\]](#):

- **Drinking water**
- **Rice** and fish
- Air

Long-term exposure to high amounts of arsenic may be linked to health problems, including [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Skin disorders
- Heart disease
- High blood pressure
- Stroke
- Diabetes
- Cancer

Please note: *Soaking, washing until clear, and cooking rice with a high (1:6) water-to-rice ratio may help reduce rice’s arsenic content* [\[R\]](#), [\[R\]](#), [\[R\]](#).

How it helps

A study of 1,892 women over 50 years of age associated high urinary arsenic, cadmium, and tungsten with BMD loss [\[R\]](#).

Arsenic can interfere with the process of bone formation, making the bones weak and brittle.

72



Balance And Mobility Training

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Incorporate balance and mobility exercises into your routine three to four times per week. Each session should last approximately 30 minutes and include activities such as standing on one foot, walking heel to toe, and tai chi or yoga. Start with simple exercises and gradually increase difficulty as your balance improves.

TYPICAL STARTING DOSE

30 minutes

Description

Balance and mobility training exercises, such as yoga or tai chi, can improve stability and reduce the risk of falls, particularly among older adults. These exercises enhance overall physical function.

How it helps

A meta-analysis of 6 trials found that balance training reduced the risk of falls by 58.7% in patients with osteoporosis [\[R\]](#).

Improving balance and mobility can prevent falls, a common cause of bone injuries, particularly in older adults.

73



Pycnogenol

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 100 mg of pycnogenol supplement daily. This can be taken in a single dose or divided into two doses of 50 mg each, one in the morning and one in the evening.

TYPICAL STARTING DOSE

100 mg

Description

Pycnogenol (pine bark extract) is derived from the bark of the maritime pine (Pinus pinaster). It has been used in traditional n European folk medicine for centuries, and more recently as a supplement. The extract contains a group of bioactive compounds known as proanthocyanidins, which may be beneficial in supporting cardiovascular health, promoting skin health, and aiding in the management of various conditions related to inflammation and oxidative stress.

Pycnogenol comes from the bark of pine trees that grow in the Mediterranean [\[R\]](#), [\[R\]](#).

It may improve [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Athletic performance
- Seasonal allergies
- Cognitive function
- Joint health
- Varicose veins

How it helps

Pycnogenol boosts bone health by stimulating the cells that are involved in bone formation and by suppressing the cells responsible for bone breakdown. This can help maintain strong, healthy bones and may be particularly beneficial for those with weakening bones, or conditions such as osteoporosis.

In a [placebo-controlled trial of 40 postmenopausal, osteopenic women](#), supplementation with pine bark extract (Oligopin, 250 mg/day) for 12 weeks **increased the bone markers bone alkaline phosphatase and procollagen type 1 amino-terminal propeptide while decreasing C-terminal telopeptide of type I collagen** [\[R\]](#).

The same supplement (150 mg/day for 12 weeks) **increased osteocalcin levels and the ratio of OC to CTX1, plasma total thiol content, TAC, plasma activity of both MnSOD and catalase, and the transcript level of Nrf2, MnSOD, and catalase, while decreasing plasma protein carbonyl content**, in a [placebo-controlled trial of 43 postmenopausal women with osteopenia](#) [\[R\]](#).

74



Maca

IMPACT1 / 5

EVIDENCE1 / 5

How to implement

Take 1.5 to 3 grams of maca root powder daily, mixed into a glass of water or a smoothie, preferably in the morning. Continue this regimen for at least 6 to 12 weeks to experience potential benefits.

TYPICAL STARTING DOSE

2 g

Description

Maca is a root vegetable native to Peru and is often used as a dietary supplement for its potential to boost energy and enhance sexual function. While research on maca's health benefits is ongoing, it is valued for its potential adaptogenic properties and use in traditional medicine.

Maca (*Lepidium meyenii*) is a plant from the mustard family. It is native to the Andes mountains of Peru [\[R\]](#).

Maca is used as a food. People also take it as a supplement to potentially support [\[R\]](#):

- Sexual function
- Fertility
- Mood

How it helps

In a placebo-controlled trial of 45 postmenopausal osteoporotic women with chronic periodontitis, supplementation with powdered maca seeds (1 g, 3x/day) for 6 weeks increased bone mass and improved clinical attachment and pocket depth. It showed synergistic effects with alendronate [\[R\]](#).

Maca is rich in essential vitamins and minerals, such as calcium, which are crucial for enhancing bone health and preventing osteoporosis. Its polyphenol content could potentially inhibit bone breakdown, leading to stronger, healthier bones.

75



Shilajit

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a pea-sized portion (approximately 500mg) of purified shilajit resin and dissolve it in warm water, tea, or milk. Consume this once daily, ideally in the morning on an empty stomach for best absorption. Continue this routine daily for 6 to 8 weeks to observe benefits.

TYPICAL STARTING DOSE
500 mg

Description

[Shilajit](#), also known as shilaras or bitumen, is a tar-like substance that oozes from sedimentary rocks worldwide, especially in the Himalayas. It is made of rock humus, minerals, and organic substances (e.g., marine organisms) decomposed by microbes and compressed by layers of rock [\[R\]](#).

Shilajit is called a rasayana (rejuvenator) and a maharasa (super-vitalizer) in Ayurveda (indigenous Indian medicine). It is traditionally used to [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Boost energy levels
- Improve memory and focus
- Fight stress
- Manage male reproductive disorders

Shilajit is sold as capsules or powder [\[R\]](#).

How it helps

Shilajit is packed with minerals, including calcium and phosphorus, which are essential for bone health and preventing conditions like osteoporosis. Additionally, its anti-inflammatory properties can help with joint health and reducing bone loss.

In a [placebo-controlled trial of 60 postmenopausal women with osteopenia](#), supplementation with shilajit extract (250-500 mg/day) for 48 weeks **attenuated the decrease of BMD in the lumbar spine and femoral neck and decreased the bone turnover markers CTX-1, BALP, and RANKL, while increasing OGP** [\[R\]](#).

76



Perilla Oil

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 600-900 mg of perilla oil daily, ideally with meals to enhance absorption. This should be divided into two or three doses throughout the day. Continue this regimen for at least 8 to 12 weeks to evaluate its effectiveness.

TYPICAL STARTING DOSE

600 mg

Description

Perilla oil is an edible oil extracted from the seeds of the *Perilla frutescens* plant, which is native to Asia. It is rich in omega-3 fatty acids, particularly alpha-linolenic acid (ALA), and is known for its potential health benefits, including supporting heart health, reducing inflammation, and providing essential nutrients like vitamin E and omega-3s.

How it helps

Perilla oil is rich in omega-3 fatty acids, which promotes the absorption of calcium in your body, strengthening your bones. It also has anti-inflammatory properties that can help alleviate conditions like osteoporosis and rheumatoid arthritis.

Perilla seed oil (7.0 mL/day for 12 months) in a double-blind study with 52 Japanese adults improved age-related bone mineral density decline. It reduced bone resorption, increased α-linoleic acid levels, raised %YAM levels, and lowered serum TRACP-5b without affecting BALP. It also increased PUFA levels in the erythrocyte plasma membrane and improved the serum BAP/d-ROM ratio [R].

77



Fructooligosaccharides (FOS)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 3 to 10 grams of fructooligosaccharides (FOS) supplement per day, preferably with meals. Start with a lower dose to assess your tolerance and gradually increase to avoid digestive discomfort. This supplement can be taken indefinitely as part of your daily routine to support gut health.

TYPICAL STARTING DOSE

3 g

Description

Fructooligosaccharides are a type of prebiotic fiber found in various fruits and vegetables. They support gut health by nourishing beneficial gut bacteria, promoting digestive regularity, and potentially enhancing overall well-being.

How it helps

In a 24-month placebo-controlled trial of 300 postmenopausal women, supplementation with fructooligosaccharides (3.6 g/day) as an add-on to calcium slowed the rate of bone loss better than calcium alone [\[R\]](#).

Fructooligosaccharides may help by promoting better absorption of minerals like calcium and magnesium.

78



Avoid PFAS Exposure

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

To avoid PFAS exposure, choose products that are labeled PFAS-free, especially when selecting cookware, cosmetics, and clothing. Reduce the consumption of packaged and fast foods since the packaging often contains PFAS. Use a water filter that is certified to remove PFAS compounds for your drinking and cooking water.

Description

Avoiding per- and polyfluoroalkyl substances (PFAS) exposure means avoiding products and environments contaminated with these chemicals, which can help prevent potential health issues like hormonal disruption and adverse effects on liver and immune function.

How it helps

A study of 6416 participants found a negative association between PFOA, PFOS, PFHxS, PFDE, and PFNA and BMD in women, especially if premenopausal [\[R\]](#).

A study of 366 mother-child pairs associated PFAS exposure in childhood with a decreased BMD at age 5 years [\[R\]](#).

79



Blackcurrant Supplement

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a blackcurrant supplement containing 300mg of blackcurrant extract daily, preferably with a meal to enhance absorption. Continue this regimen for at least 8 weeks to observe potential benefits.

Description

Blackcurrant supplements are often used to harness the health benefits of blackcurrants in a convenient form. They can provide a concentrated source of antioxidants and nutrients that support various aspects of well-being.

Black currant oil contains between 150-200mg of GLA per gram.

How it helps

Blackcurrant supplements are rich in calcium and vitamin C, both vital for bone health. Calcium strengthens the bone structure, while vitamin C aids in the production of collagen, needed for bone flexibility and resilience.

In a 6-month study with 40 peri- and early postmenopausal women, blackcurrant supplementation at 784 mg/day improved bone mineral density and increased a marker of bone formation (P1NP) compared to a control group, indicating its potential in mitigating postmenopausal bone loss [\[R\]](#).

80



Avoid Exposure to Heavy Metals

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

To avoid exposure to heavy metals, ensure you're not using cosmetic products with heavy metals, opt for organic foods to minimize pesticide exposure, and use filters for drinking water to remove possible contaminants. Check for lead-based paints in older homes and avoid cooking or storing food in uncoated metal containers. When possible, choose glass or BPA-free plastics instead.

Description

Heavy metals are elements naturally found in the environment. They are also used for agricultural, industrial, and medicinal purposes. Some can even be found in small amounts in your body [\[R\]](#), [\[R\]](#).

Long-term exposure to high amounts of heavy metals can be harmful to your health [\[R\]](#), [\[R\]](#).

Heavy metals that are most often linked to health problems include [\[R\]](#), [\[R\]](#):

- Lead
- Cadmium
- Arsenic
- Chromium
- Mercury

How it helps

A study of 1,892 women over 50 years of age associated high urinary arsenic, cadmium, and tungsten with BMD loss [\[R\]](#).

Exposure to heavy metals like lead and cadmium can interfere with the metabolism of calcium, an essential element for bone health.

81



Blackcurrants

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Incorporate about 1/2 cup of fresh or frozen blackcurrants into your daily diet. You can add them to your morning yogurt, oatmeal, or smoothies. For those who prefer, blackcurrant juice or preserves can also be consumed, but be mindful of added sugars in processed forms.

Description

Blackcurrants are small, nutrient-dense berries packed with vitamins, minerals, and antioxidants. They are known for their potential to promote heart health, improve cognitive function, and provide essential nutrients for overall vitality.

How it helps

In a placebo-controlled trial of 40 menopausal women, consuming blackcurrant powder (784 mg/day) for 6 months decreased whole-body loss of bone mineral density while increasing a bone formation marker (P1NP) [\[R\]](#).

Blackcurrants are a rich source of vitamin C and antioxidants, both of which are vital for collagen production. Additionally, their high potassium content may assist in preventing bone loss.

82



Avoid Phthalate Exposure

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

To avoid phthalate exposure, check product labels and choose phthalate-free options for personal care items, plastics (look for recycling codes 3 and 7 or the letters 'V' or 'PVC'), and household products. Additionally, reduce the use of plastic containers for food storage, especially those not marked as 'phthalate-free', and avoid microwaving food in plastic containers. Aim to make these changes consistently in your daily life for long-term health benefits.

Description

Avoiding phthalate exposure involves choosing phthalate-free products, such as personal care items and plastics, to minimize potential endocrine-disrupting effects and protect reproductive and hormonal health.

How it helps

480 postmenopausal women (NHANES): Phthalates were negatively associated with spinal BMD. Some associations were modified by age or BMI. The cross-sectional study design, uncertainty regarding the critical time window of exposure, the potential for exposure misclassification, and residual confounding limit our abilities to draw causal conclusions [\[R\]](#).

A NHANES 2005-2008 study with 398 postmenopausal women found that higher urinary levels of specific phthalate metabolites were linked to lower bone mineral density and increased osteoporosis risk. This indicates that phthalate exposure may adversely affect bone health in postmenopausal women [\[R\]](#).

83



Shock Wave Therapy

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Schedule and attend sessions for extracorporeal shock wave therapy (ESWT) with a qualified healthcare provider. Typically, treatments may involve 1 to 3 sessions a week over a span of 3 to 4 weeks, depending on the condition being treated and the severity of symptoms.

Description

Extracorporeal shockwave therapy is a medical treatment that uses shockwaves to stimulate healing and reduce pain in various musculoskeletal conditions. It is often used for conditions such as plantar fasciitis and tendinitis.

In extracorporeal shockwave therapy, sound waves are emitted and passed through parts of the body. Doctors use it to help reduce pain and stimulate tissue recovery in people [\[R\]](#), [\[R\]](#).

How it helps

In a [non-placebo-controlled trial of 64 postmenopausal women with osteoporosis](#), receiving extracorporeal shock wave therapy **(especially at high dose) for 12 months improved BMD** [\[R\]](#).

84



Tennis

IMPACT

1 / 5

EVIDENCE

1 / 5

Description

Tennis is a great way to get exercise, improve your cardiovascular health, and burn calories. It can also help you build strength, improve your coordination, and relieve stress.

How it helps

In a non-placebo-controlled trial of 28 young tennis players, 47 adult tennis players, and 70 controls, tennis players showed increased bone mineralization at diaphyseal skeletal sites [\[R\]](#).

85



Avoid Dioxin

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Reduce consumption of animal fats, since dioxins accumulate in fat tissue. Choose lean cuts of meat, and opt for organic or pasture-raised when possible to minimize exposure. Additionally, avoid burning trash that contains plastic, treated wood, or chlorinated chemicals to prevent dioxin release into the environment.

Description

Avoiding exposure to dioxin, a highly toxic environmental pollutant, can help protect against serious health risks, including cancer and hormonal disruptions. Reducing contact with dioxin-contaminated sources such as certain foods and industrial emissions is essential for long-term health.

How it helps

A study of 262 women and 227 men associated exposure to the dioxin 1,2,3,4,6,7,8-HpCDD with low BMD, but only in women [\[R\]](#).

Dioxins can lead to bone damage by decreasing bone density and mineral content.

86

Riboflavin (Vitamin B2)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take a riboflavin (vitamin B2) supplement daily, with a dose ranging from 5mg to 400mg, depending on the specific health concern or advice from a healthcare provider. Swallow the supplement with water, preferably with a meal to enhance absorption. This regimen can be continued long-term or as directed by a healthcare professional.

TYPICAL STARTING DOSE

25 mg

Description

Riboflavin is a water-soluble B vitamin found in various foods like dairy products, leafy greens, and lean meats. It plays a crucial role in energy production, metabolism, building red blood cells, and maintaining healthy skin and eyes.

[Vitamin B2](#) helps our cells create energy. It’s also known as riboflavin [\[R\]](#), [\[R\]](#).

This vitamin is important for [\[R\]](#), [\[R\]](#):

- Brain, liver, and gut health
- Building red blood cells

Riboflavin deficiency is rare in the US. People with gut, eating, or hormonal disorders may be at a higher risk. Alcohol abuse and certain medications can also deplete this vitamin [\[R\]](#), [\[R\]](#).

Good sources of riboflavin include [\[R\]](#), [\[R\]](#):

- Eggs
- Dairy
- Lean and organ meats
- Green vegetables
- Fortified cereals

How it helps

Riboflavin (Vitamin B2) helps your body generate energy from proteins, carbs and fats; this energy is essential for maintaining strong and healthy bones. Additionally, B2 enhances the body's absorption of essential minerals for bone health, like calcium and magnesium.

A [study of 1700 healthy postmenopausal women](#) found **reduced BMD in women with the MTHFR ‘TT’ genotype, but only among those with the lowest B vitamin (including riboflavin) intake** [\[R\]](#).

Similarly, a [study of 1241 women](#) followed up for 6.6 years associated **increasing dietary riboflavin intake with higher BMD in those with the ‘T’ allele of MTHFR C677T** [\[R\]](#).

PERSONALIZED TO YOUR GENES

People with your [MTHFR](#) gene variant may have lower BMD and increased risk of fractures if their riboflavin intake is low [\[R\]](#), [\[R\]](#), [\[R\]](#).

YOUR GENETIC VARIANTS

GENE	SNP	GENOTYPE	EVIDENCE
MTHFR	rs1801133	AA	

How to implement

TYPICAL STARTING DOSE

1000 mg

Description

How it helps

AKG increases food intake, leading to an increase in muscle and bone growth in animal models. The treatment of 18-month-old mice with AKG increased bone mass, diminished age-related bone loss, and induced osteogenic differentiation [R].

88



Cupping Therapy and Acupuncture

IMPACT

0 / 5

EVIDENCE

1 / 5

How to implement

For cupping therapy, schedule sessions with a certified practitioner, typically once a week for four to six weeks. For acupuncture, plan for initial sessions to occur 1-2 times per week for the first few weeks, then adjust frequency based on your response, often tapering to once a month for maintenance.

Description

Cupping therapy is an alternative therapy that involves placing cups on the skin to create suction in order to relieve pain and muscle tension. [Acupuncture](#) is a part of traditional Chinese medicine. It involves inserting thin needles at specific points on the body. People use it to releive pain and allergies, as well as reduce nausea and improve sleep.

How it helps

In an uncontrolled trial of 57 patients with primary osteoporosis, the combination of cupping therapy and acupuncture (3x/week for 3 months) increased quality of life in 48 of the cases [\[R\]](#).

Cupping and acupuncture can stimulate blood flow, potentially expelling toxins and facilitating the absorption of nutrients needed for bone health.

89



Geranylgeraniol

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Geranylgeraniol can be taken as a dietary supplement, typically in the form of capsules or softgels. The recommended dosage varies depending on individual health needs and the specific product formulation. It is generally advised to start with a lower dose and gradually increase it, under the guidance of a healthcare professional. Taking it with a meal may enhance absorption and efficacy.

TYPICAL STARTING DOSE

150 mg

Description

Geranylgeraniol is a natural compound found in various plants and herbs, known for its potential health benefits. It plays a crucial role in the body's biosynthesis of essential molecules like CoQ10 and vitamin K2. This compound is noted for its anti-inflammatory, antioxidant, and anti-cancer properties, making it a promising supplement for enhancing overall well-being.

How it helps

Geranylgeraniol may play a crucial role in bone health by preventing the inhibition of osteoclast formation and bone resorption. This is particularly significant in the context of bisphosphonate therapy, where GG can counteract the adverse effects on osteoclasts, thereby maintaining bone health [\[R\]](#).

Additionally, GG supplementation may improve bone microstructure in obese mice, likely through the suppression of pro-inflammatory cytokines and modification of gut microbiota [\[R, R\]](#).

90



EPA (Omega-3)

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take an EPA (Eicosapentaenoic acid) supplement in the form of fish oil or algae oil capsules, aiming for a dosage of 500-1000 mg per day. This should be taken with a meal to improve absorption, and continuous daily use is recommended for general heart health and to support mental well-being.

TYPICAL STARTING DOSE
500 mg

Description

EPA is an omega-3 fatty acid found in fish oil supplements and fatty fish like salmon. It is known for its anti-inflammatory properties and is associated with cardiovascular health, mood regulation, and cognitive function.

[Omega-3 fatty acids](#) are some of the healthiest fats we can eat. They help lower inflammation and protect the heart, brain, and eyes. Our bodies produce less omega-3s than we need for optimal health, so it's important to get enough through food or supplements [\[R, R, R\]](#).

There are three major types of omega-3s: ALA, EPA, and DHA. **EPA and DHA are vital for cognition and mental health** [\[R, R\]](#).

The body can produce eicosapentaenoic acid (EPA) from alpha-linolenic acid (ALA), another type of omega-3 fatty acid found in plants. We can also get EPA directly from food sources such as oily fish, shellfish, and algae. EPA helps make DHA. [\[R, R, R\]](#).

Please note: *Fish oil can interact with blood thinners (like aspirin, Plavix, Coumadin). Consult your doctor before taking fish oil* [\[R\]](#).

How it helps

A 36-month pilot study with 65 elderly women (mean age 79.5) on a low calcium diet found GLA + EPA, along with calcium, showed positive effects on bone health [\[R\]](#).

EPA may help by enhancing calcium absorption in your body, which strengthens your bones. Furthermore, it can reduce inflammation that may contribute to bone loss.

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Alpha-Linolenic Acid (ALA)

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Incorporate foods high in alpha-linolenic acid (ALA) into your daily diet. This means eating about a tablespoon (14 grams) of flaxseeds or chia seeds, a quarter cup (30 grams) of walnuts, or using one tablespoon of flaxseed oil every day.

Description

Alpha-linolenic acid (ALA) is a type of omega-3 fatty acid found in plant-based sources like flaxseeds, chia seeds, and walnuts. It is essential for maintaining heart and brain health and is considered a healthy dietary fat.

How it helps

Genetically higher levels of ALA may be associated with improved BMD and lower risk of fractures [R].

ALA aids in calcium absorption, potentially improving overall bone strength and reducing the risk of osteoporosis.

Please note: *There is no evidence from controlled clinical trials to support this recommendation. It is included based on uncontrolled clinical trials, animal or cell studies, or non-scientific criteria. Please take this recommendation with a grain of salt until more research is available.*

92



Cupping Therapy

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

To practice cupping therapy as part of your lifestyle, schedule sessions with a qualified therapist once or twice a month to address specific concerns or for general wellness. Each session usually lasts between 5 to 15 minutes. Consistent treatment over several months may yield the best results.

TYPICAL STARTING DOSE

15 minutes

Description

Cupping therapy is an alternative therapy that involves placing cups on the skin to create suction. Some believe it may help with pain relief and muscle tension.

How it helps

In an uncontrolled trial of 57 patients with primary osteoporosis, the combination of cupping therapy and acupuncture (3x/week for 3 months) increased quality of life in 48 of the cases [R].

Cupping therapy may help by stimulating blood flow, reducing inflammation, and promoting healing.

93



Gamma-Linolenic Acid (GLA)

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Take 200-300 mg of gamma-linolenic acid (GLA) daily as a supplement, usually available as capsules, for a period of 6 months to assess its effects on your condition. It is best absorbed when taken with food.

TYPICAL STARTING DOSE

200 mg

Description

GLA is an omega-6 fatty acid found in certain plant oils, such as evening primrose oil and borage oil. It may have anti-inflammatory properties and can potentially benefit skin health, hormonal balance, and overall well-being.

Your body naturally makes **gamma-linolenic acid (GLA)** to help control inflammation. It’s a polyunsaturated fatty acid (PUFA) found in plants like [R](#), [R](#):

- [Borage](#)
- Blackcurrant
- Evening primrose

People mainly use GLA for [R](#):

- Skin conditions
- Dry eyes
- Hair and nail care

How it helps

A 36-month pilot study with 65 elderly women (mean age 79.5) on a low calcium diet found GLA + EPA, along with calcium, showed positive effects on bone health [R](#).

GLA promotes bone health by reducing inflammatory processes that can lead to bone loss. This fatty acid also supports calcium absorption and boosts collagen formation, important for maintaining bone strength.

94



Acupuncture

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Visit a licensed acupuncturist for a session, typically lasting between 30 to 60 minutes, once or twice a week. Depending on your specific condition, a course of treatment might range from a few weeks to several months.

TYPICAL STARTING DOSE

1 hour

Description

Acupuncture is a part of traditional Chinese medicine. It involves inserting thin needles at specific points on the body. People use it to relieve pain and allergies, as well as reduce nausea and improve sleep.

[Acupuncture](#) is a part of traditional Chinese medicine. It involves **inserting thin needles at specific points on the body**. People use it to [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Relieve pain
- Improve sleep quality
- Relieve allergies
- Reduce nausea

How it helps

In an uncontrolled trial of 57 patients with primary osteoporosis, the combination of cupping therapy and acupuncture (3x/week for 3 months) increased quality of life in 48 of the cases [\[R\]](#).

Acupuncture can stimulate points on the body that are known to increase bone health by improving circulation, therefore supplying bones with necessary nutrients. The treatment can also potentially help in reducing inflammation and pain often associated with bone conditions.

95



Avoid L-Tyrosine Supplements

IMPACT

0 / 5

EVIDENCE

0 / 5

How to implement

Do not purchase or consume supplements that contain L-tyrosine. This includes checking the labels of multi-vitamins or any performance-enhancing or nootropic supplements to ensure they do not list L-tyrosine as an ingredient.

Description

Avoiding excessive L-tyrosine supplements is advisable, as high doses may have potential side effects and interactions with medications. It's important to consult with a healthcare provider before supplementing with L-tyrosine to ensure safe and appropriate use for individual health needs.

How it helps

Genetically elevated tyrosine levels were associated with lower bone mineral density in one study [\[R\]](#).

Next Steps

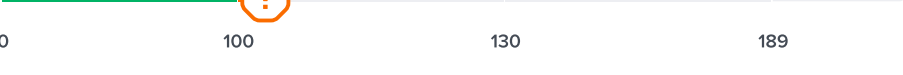
Remember, your genes only tell one important part of your health story!

Now that you've seen your DNA-based results for this health topic, let's take a look at other contributing factors.

Your lab results

Your lab results are impacted by the combined effect of your genes, environment and lifestyle.

Lab tests will give you the best picture of your current health status, while your genes provide insight into your health predispositions and which recommendations are best for you.

	TSH	2.76 mIU/mL		9 Nov 2025
	Cystatin C	0.57 mg/L		9 Nov 2025
	ALP	68 IU/L		9 Nov 2025
	Phosphorus	2 mg/dL		9 Nov 2025
	SHBG	39.3 nmol/L		9 Nov 2025
	GGT	9 IU/L		9 Nov 2025
	LDL Cholesterol	103 mg/dL		9 Nov 2025
	Calcium, Ionized	1.1 mmol/L		9 Nov 2025
	Magnesium	2.17 mg/dL		9 Nov 2025

