UGENOME

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Bone Health

Summary Report

REPORT CATEGORY

BONE HEALTH

Sample Client

Report date: 30 April 2026

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Personal information

NAME

Sample Client

SEX AT BIRTH

Male

HEIGHT

5ft 10" 178cm

WEIGHT

215lb 97.5kg

REPORT PROVIDED BY

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Summary

Bone health is crucial for maintaining a strong skeletal system, mobility, and overall physical well-being. While lifestyle factors such as diet and exercise play important roles in bone health, genetics also significantly influences how strong and resilient your bones are.

Genetic predispositions can affect your risk for conditions such as osteoporosis, fractures, and spine problems. These predispositions can also determine how efficiently your body absorbs and utilizes essential nutrients like calcium, vitamin D, and magnesium, which are vital for bone strength and density.

This report delves into the genetic markers associated with various bone health conditions and the nutrients that support bone integrity. Understanding your genetic strengths and weaknesses can help you take proactive steps to prevent bone-related issues.

This summary report contains:

Overview of Your Results

Bone Health Problems

TYPICAL LIKELIHOOD

Fractures

Typical likelihood of breaking a bone

TYPICAL LIKELIHOOD

Spinal Canal Narrowing

Typical likelihood of spinal stenosis

TYPICAL LIKELIHOOD

Osteoporosis

Typical likelihood of osteoporosis

LESS LIKELY

Bone Infection

Less likely to have osteomyelitis

LESS LIKELY

Scoliosis

Less likely to have scolisosis

LESS LIKELY

Bone Cancer

Less likely to have bone cancer

LESS LIKELY

Bone Spurs

Less likely to have bone spurs

LESS LIKELY

Hyperparathyroidism

Less likely to have high PTH

LESS LIKELY

Hypoparathyroidism

Less likely to have hypoparathyroidism

Bone Health Nutrients

INCREASED NEED

Calcium

Likely increased need for calcium

INCREASED NEED

Vitamin K

Likely increased vitamin K need

TYPICAL NEED

Vitamin D

Likely typical need for vitamin D

TYPICAL LEVELS

Phosphate

Predisposed to typical phosphate levels

TYPICAL NEED

Magnesium

Likely typical need for magnesium

TYPICAL ACTIVITY

VDR (Vitamin D)

Likely typical VDR activity

TYPICAL ACTIVITY

CYP2R1 (Vitamin D)

Predisposed to typical CYP2R1 activity

HIGHER ACTIVITY

GC (Vitamin D)

Likely higher GC activity

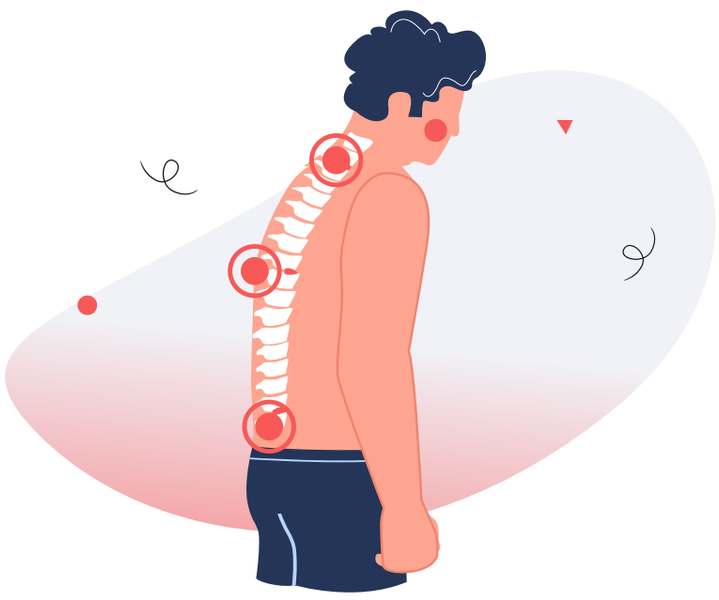
Recommendations Overview

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
1	Broccoli	
2	Leafy Green Vegetables	
3	Collard Greens	
4	Spinach	
5	Kale	
6	Calcium Supplements	1000 mg
7	Calcium Carbonate	2500 mg
8	Soy	
9	Swiss Chard	
10	Turnip greens	
11	Maintain Optimal Vitamin D Levels	1000 iu
12	Vitamin D and Calcium	
13	Chicory	
14	Vitamin K2	100 mcg
15	Salmon	

Your Results in Details



Bone Health Problems

Bone health problems, such as osteoporosis, fractures, and scoliosis, can significantly impact your skeletal health and overall quality of life. This section focuses on the genetic predispositions that may increase your risk for conditions like bone infections, spinal stenosis, and bone cancer.

Understanding your genetic susceptibility to these conditions can help you take preventive measures, such as incorporating weight-bearing exercises, adjusting your diet, or seeking medical interventions early on.

TYPICAL LIKELIHOOD

Fractures

Typical likelihood of breaking a bone

TYPICAL LIKELIHOOD

Spinal Canal Narrowing

Typical likelihood of spinal stenosis

TYPICAL LIKELIHOOD

Osteoporosis

Typical likelihood of osteoporosis

LESS LIKELY

Bone Infection

Less likely to have osteomyelitis

LESS LIKELY

Scoliosis

Less likely to have scolisosis

LESS LIKELY

Bone Cancer

Less likely to have bone cancer

LESS LIKELY

Bone Spurs

Less likely to have bone spurs

LESS LIKELY

Hyperparathyroidism

Less likely to have high PTH

LESS LIKELY

Hypoparathyroidism

Less likely to have hypoparathyroidism

Fractures

Factors that might increase the risk of fractures include:

- Osteoporosis or decreased bone density
- Older age
- Participation in high-risk sports or activities
- Previous fractures
- Falling or repeated trauma
- Low body weight or malnutrition
- Conditions that affect bone quality, such as cancer or certain endocrine disorders
- Genetics

Genetics can play a role in bone health and, consequently, susceptibility to fractures. Genes are involved in determining bone density, bone structure, and the rate at which bone is broken down and rebuilt. Having a family history of osteoporosis or frequent fractures may indicate a genetic predisposition.

Mooreover, genetically high testosterone (in women) and alpha-linolenic acid may be causally associated with a lower risk of fractures [R, R].

TYPICAL LIKELIHOOD

Typical likelihood of breaking a bone based on 909,141 genetic variants we looked at

31st

PERCENTILE

Your risk is **greater than 31% of the population** and **lower than 69% of the population.**

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
MARCO	rs115242848	CC
HLA-DQA1	rs2071805	CC
VARS2	rs9262558	CC
SP7	rs144680237	CC
CPED1	rs3779381	AA
ZBTB40	rs34414754	AA
WLS	rs2566755	TT
NTNG1	rs76259395	AA
CTNNBL1	rs6063547	GG
CPED1	rs10242100	AA
MRPL20	rs12408050	AG
INKA2	rs6658723	TT
FKBP11	rs3741619	GA
ETS2	rs11088458	AG
HBZ	rs10794639	GA
SMOC1	rs3742909	GA
/	rs2431108	TC
TSHZ3	rs2111530	GA
LGR4	rs11030084	CT
TSPAN4	rs28672671	AG
RPL10L	rs12884871	TC

GENE	SNP	GENOTYPE
HOXC6	rs7308105	TC
/	rs67174662	GA
DRD1	rs2471020	TC
ARL14EP	rs494221	AG
MN1	rs139959245	CC
TRERF1	rs72857666	CC
FHIT	rs7616516	GG
SPP1	rs33983260	DEL(AG)DEL(AG)
GAL	rs880610	GG
GAL	rs56154705	CC
CTNNB1	rs389264	CC
RSPO3	rs9482772	CC
ZNF536	rs28633123	CC
/	rs2709062	GG
CCDC170	rs4869744	TT
BCL11A	rs974135	CC

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

Spinal Canal Narrowing

The symptoms of spinal stenosis can vary widely, from mild discomfort to severe impairment. Some individuals may experience back pain, tingling, weakness, or numbness that can radiate from the back into the buttocks and legs, commonly referred to as sciatica when it affects the sciatic nerve.

Diagnosis typically involves physical examination, assessment of medical history, and imaging studies such as MRI or CT scans to view the degree of canal narrowing and nerve compression. Treatment options range from conservative measures, like physical therapy and medications, to interventional procedures such as epidural steroid injections, and in advanced cases, surgery to relieve the pressure on the nerves might be considered.

TYPICAL LIKELIHOOD

Typical likelihood of spinal stenosis based on 1,001,035 genetic variants we looked at

53rd

PERCENTILE

Your risk is **greater than 53% of the population** and **lower than 47% of the population.**

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
IPP	rs2356581	AA
DYNC1I1	rs2051706	GG
TRIM32	rs1040851	CC
PDE3A	rs7298820	AT
SMAD3	rs28613758	TC
SLITRK6	rs2183749	CA
ELMOD2	rs184579809	TT
HEY1	rs143958409	CC
AGMO	rs7808567	CC
GFPT1	rs6728752	AA
CALHM6	rs2637678	CC

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

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
- 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*)

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	AG
FKBP11	rs3741619	GA
ETS2	rs11088458	AG
HBZ	rs10794639	GA
SMOC1	rs3742909	GA
HOXC6	rs7308105	TC
DIO2	rs225014	TT

- 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
MN1	rs139959245	CC
SPP1	rs33983260	DEL(AG)DEL(AG)
GAL	rs880610	GG
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.

Bone Infection

The diagnosis and treatment of osteomyelitis require a multifaceted approach. Imaging tests such as X-rays, MRI, or CT scans are often used to identify the location and extent of the infection, while blood tests and bone biopsies help determine the particular pathogen responsible.

Treatment typically involves a prolonged course of antibiotics, and in some cases, surgery may be necessary to remove portions of the infected bone or to drain abscesses. Early aggressive treatment is crucial to prevent the infection from becoming chronic or leading to complications such as bone destruction or sepsis, a life-threatening response to infection.

LESS LIKELY

Less likely to have osteomyelitis based on 30,087 genetic variants we looked at

1st

PERCENTILE

Your risk is **greater than 1% of the population** and **lower than 99% of the population.**

Scoliosis

The impact of scoliosis on an individual can range from negligible to severe, potentially leading to discomfort, pain, and in some cases, respiratory and cardiovascular issues due to the distortion of the ribcage. Treatment options depend on the severity and progression of the curve and can include observation, bracing, or surgical intervention.

Bracing is commonly used to prevent further progression of the curve in growing children and adolescents, while surgery may be reserved for more severe cases to correct and stabilize the spine.

LESS LIKELY

Less likely to have scolisosis based on 541,912 genetic variants we looked at

19th

PERCENTILE

Your risk is **greater than 19% of the population** and **lower than 81% of the population.**

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
DPCD	rs11190870	CT
OBSCN	rs12029076	GG
CCDC171	rs78223574	AA
FTO	rs12149832	GG
TBX1	rs1978060	GG
/	rs2467146	AA
CREB5	rs160335	GG
ADGRG6	rs9389985	GA
BNC2	rs7028900	GC
MTMR11	rs11205303	TC
CSMD1	rs11787412	CA
NT5DC1	rs482012	TG
/	rs149429732	GG
/	rs183966018	CC
MYORG	rs188915802	GG
NKX6-1	rs141903557	GG
/	rs397948882	TT
PLXNA2	rs17011903	CC
CDH13	rs2194285	AA
/	rs6047716	TT
IL11RA	rs13290451	AA

GENE	SNP	GENOTYPE
LMO3	rs11057071	GG

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

Bone Cancer

The exact causes of bone cancer are not well understood, but several factors can increase the risk [R]:

- Genetic disorders: Certain inherited genetic disorders, such as hereditary retinoblastoma and Li-Fraumeni syndrome, are linked to a higher risk of bone cancer.
- Previous radiation therapy: Exposure to high doses of radiation, such as those used in previous cancer treatments, can increase the risk.
- Paget's disease: This bone condition, mostly seen in elderly people, may increase the risk of developing osteosarcoma.
- Bone marrow transplantation: This medical treatment might slightly increase the risk of developing bone cancer later in life.

Treatment depends on the type, stage, location of the cancer, and the patient's overall health [R]:

- Surgery: The primary treatment for bone cancer is surgically removing the entire tumor while preserving as much normal bone and function as possible.
- Chemotherapy: Often used before surgery to shrink the tumor and after to kill any remaining cancer cells.
- Radiation therapy: Used if surgical removal isn't possible, or to reduce symptoms in advanced cases.
- Targeted therapy: Drugs that specifically target cancerous cells without affecting normal cells are being developed and used in some types of bone cancer.

The prognosis for bone cancer depends on factors such as the type of cancer, the extent of its spread, and how well it responds to treatment. Early diagnosis and advanced treatments have improved the prognosis for many people with bone cancer, especially for those with localized disease.

Please note: This report is not diagnostic and can't be used to make any medical decisions. Most cancers are uncommon and have a strong environmental component. Even if your genetic predisposition is high, you will most likely not develop the disease. This report doesn't test for hereditary cancer syndromes or 'cancer genes'. These are usually caused by rare mutations that can't be analyzed by our test. If you're concerned about your risk of hereditary cancer, consider getting a specialized test at a reference laboratory.

LESS LIKELY

Less likely to have bone cancer based on 24,472 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
TASOR2	rs2797501	AA
/	rs7591996	CA
PARM1	rs17248137	AA
LRMDA	rs17465450	AA
GLDC	rs55933544	CC
SNTB1	rs6986444	CC
MECOM	rs6797464	GG
GPD1L	rs4955138	AA
HSPB8	rs12146774	CT
ARVCF	rs9332377	TC
AGMO	rs7777171	CT
GRM4	rs1906953	TC
ADAMTS17	rs2086452	GA
ADAMTS6	rs17206779	TC
DLEU7	rs573666	CC

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

Bone Spurs

Bone spurs develop as a result of bone and joint degeneration and are primarily associated with the aging process. However, they can also arise from underlying diseases and conditions that affect bone and joint health [R]:

- Osteoarthritis: The most common cause of bone spurs, osteoarthritis involves the breakdown of cartilage, leading to joint damage and increased bone friction.
- Spinal degeneration: Bone spurs commonly occur in the spine as a result of the degeneration of discs and joints, often due to aging.
- Mechanical stress: Repeated stress or injuries to a joint can promote the formation of bone spurs as part of the body's attempt to heal or distribute force more evenly.
- Inflammatory conditions: Diseases such as rheumatoid arthritis or diffuse idiopathic skeletal hyperostosis (DISH) can lead to bone spur formation due to ongoing inflammation.
- Genetic factors: Genetic predispositions can influence the likelihood and locations of bone spur development.

Treatment for bone spurs depends on the severity of symptoms and the location of the spurs [R]:

- Medications: Nonsteroidal anti-inflammatory drugs (NSAIDs) can help reduce pain and inflammation.
- Physical therapy: Exercises and stretches can improve flexibility and strength around the joint, reducing the symptoms caused by bone spurs.
- Corticosteroid injections: May be used to reduce inflammation in severe cases.
- Surgical removal: Considered if the bone spur is causing significant pain, mobility issues, or nerve compression, and conservative treatments have failed.

Managing bone spurs also involves lifestyle adjustments to help relieve symptoms and prevent further joint damage [R]:

- Weight management: Reducing body weight can decrease stress on weight-bearing joints, alleviating symptoms.
- Proper footwear: Choosing shoes with adequate support and cushion can relieve pain caused by bone spurs in the feet.
- Ergonomic adjustments: For spinal bone spurs, ergonomic changes to the working and living environments can help minimize symptoms.

LESS LIKELY

Less likely to have bone spurs based on 1,676 genetic variants we looked at

7th

PERCENTILE

Your risk is **greater than 7% of the population** and **lower than 93% of the population.**

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
/	rs575997043	CC
/	rs139814879	TT
/	rs140162870	CC
FAT4	rs535192512	AA
ADAMTS8	rs149729817	GG
/	rs374462308	GG
/	rs181552316	GG
/	rs182756278	CC
DENND1B	rs190073601	AA
/	rs142291828	CC
GRAMD2B	rs190360312	GG
CAPRIN2	rs542887566	CC
NPAP1	rs577272962	AA
PIK3R1	rs143106204	CC
KCTD8	rs556962187	GG
/	rs142726098	TT
PPP1CB	rs193167778	CC
/	rs139575989	GG
PCDH9	rs369611135	TT
RGS1	rs181133730	GG
/	rs572272840	GG

GENE	SNP	GENOTYPE
LRRTM4	rs181483238	GG
DDC	rs145505700	AA
EVX2	rs184519785	GG
NOX3	rs187052602	GG
OR2T5	rs142690927	CC

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

Hyperparathyroidism

Parathyroid hormone or PTH is a hormone made by the parathyroid glands. **High PTH (hyperparathyroidism)** can increase blood calcium levels and cause a range of signs and symptoms.

The most common cause of high PTH is **primary hyperparathyroidism**. It happens due to an **enlargement** in one or more parathyroid glands. Risk factors include [R, R, R]:

- Menopause (in women)
- Radiation treatment in the neck area
- Taking lithium (a drug for bipolar disorder)
- Genetics

High PTH can also be caused by conditions that reduce calcium levels. In that case, it's called **secondary hyperparathyroidism.** Risk factors include [R]:

- Severe calcium or vitamin D deficiency
- Chronic kidney disease

LESS LIKELY

Less likely to have high PTH based on 44,946 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
FIBIN	rs375264315	CC
MRPS31	rs141641942	CC
LRFN5	rs117828799	GA
SPON1	rs185432762	GA
LDLRAD3	rs2956325	CC
RASSF3	rs190001302	TT
SFTPA1	rs146467844	AA
TEX26	rs73165078	AA
HMX3	rs80212821	CC
TRHDE	rs117792731	CC
CCDC179	rs116901664	AA
CCDC179	rs78033659	AA
ANKRD30A	rs182083216	CC
UBL3	rs148955645	TT
CLEC12A	rs117564390	TT
TTC6	rs146985994	CC
CPXM2	rs78588830	CC
RIC3	rs77193115	CC
UBAC2	rs140018682	GG
PPHLN1	rs138646204	TT
/	rs116936362	GG
SLC16A9	rs116848603	GG
CYSLTR2	rs112063839	TT
CCDC179	rs143400164	AA
MED13L	rs139671128	GG
LRFN5	rs142449134	CC
CUL2	rs140499091	TT
GPR183	rs17575384	AA
TMTC4	rs116880223	TT

GENE	SNP	GENOTYPE
SMIM2	rs73178960	AA
HMX3	rs138502426	GG
FZD4	rs144806437	CC
PIP4K2A	rs185622763	CC
CYSLTR2	rs117226215	AA
SMIM2	rs73178985	AA
MED13L	rs148788830	GG
TMTC4	rs75499525	AA
GDPD4	rs150119332	CC
TAF3	rs183659978	CC
SLC35F4	rs141109822	GG
GPR26	rs139771696	GG
ADAMTS20	rs143606795	TT
PAK1	rs139847224	TT
CCDC196	rs184749281	CC
PAK1	rs190492480	CC
PAK1	rs144527614	AA
FAM155A	rs117416683	CC
FOXO1	rs144759647	CC
MSRB3	rs117523829	CC
NPS	rs146056230	GG

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

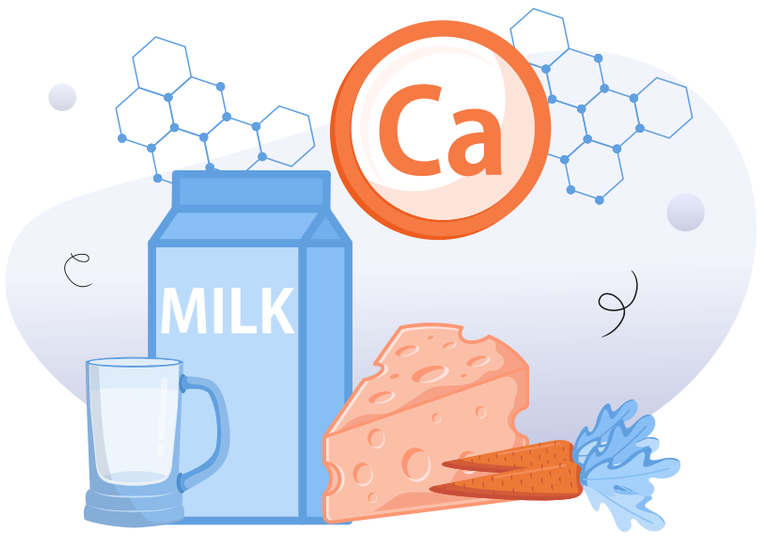
Hypoparathyroidism

The condition can be congenital or acquired; the latter often following surgical procedures that inadvertently damage or remove the parathyroid glands, such as thyroidectomy. Management of hypoparathyroidism typically involves calcium and vitamin D supplementation to normalize calcium levels and prevent symptoms.

Some patients may require long-term treatment and monitoring of their calcium and phosphorus levels to maintain a good quality of life. The introduction of recombinant PTH treatments offers a more physiologic approach to management, though their use remains relatively limited due to cost and the need for daily injections.

LESS LIKELY

Less likely to have hypoparathyroidism based on 24,224 genetic variants we looked at



Bone Health Nutrients

Proper nutrition is essential for maintaining strong and healthy bones. This section explores key nutrients like calcium, vitamin D, and magnesium, which are vital for bone density and overall skeletal health. Genetic factors can affect how well your body absorbs and processes these nutrients, influencing your risk for conditions such as osteoporosis or bone fragility.

By understanding your genetic predisposition to nutrient absorption and utilization, you can tailor your diet and supplement choices to support optimal bone health.

INCREASED NEED

Calcium

Likely increased need for calcium

INCREASED NEED

Vitamin K

Likely increased vitamin K need

TYPICAL NEED

Vitamin D

Likely typical need for vitamin D

TYPICAL LEVELS

Phosphate

Predisposed to typical phosphate levels

TYPICAL NEED

Magnesium

Likely typical need for magnesium

TYPICAL ACTIVITY

VDR (Vitamin D)

Likely typical VDR activity

TYPICAL ACTIVITY

CYP2R1 (Vitamin D)

Predisposed to typical CYP2R1 activity

HIGHER ACTIVITY

GC (Vitamin D)

Likely higher GC activity

Calcium

Key Takeaways:

- The amount of calcium in the blood at any given time is controlled by vitamin D and parathyroid hormone.
- Much of the world's population is at risk for low calcium.
- Beyond diet, it is important to maintain adequate vitamin D levels as well.
- Dairy and fortified foods are the easiest ways to ensure adequate calcium intake.
- Click the **next steps** tab for relevant labs.

Calcium is the most abundant mineral in the human body. Ninety-nine percent of the calcium in the body is stored in the bones and teeth, and only a small amount is in your bloodstream at any time. **Vitamin D** and **parathyroid hormone** closely control the amount of calcium in your blood [R,R,R].

The recommended daily intake of calcium is 1,000 mg for women who have not gone through menopause and 1,200 mg for women who have. The recommended daily intake for men is 1,000 mg [R].

Many people do not get enough calcium in their diet [R, R, R, R].

Eating more dairy products is an easy way to incorporate more calcium into your diet. You can also add non-dairy calcium sources and calcium-fortified foods like cereal and orange juice [R].

Compared to supplements, calcium from food is easier to absorb and may be better for bone building. It is also unlikely to cause side effects [R, R, R].

Your gut needs vitamin D to be able to absorb calcium. Higher vitamin D levels are linked to higher calcium levels in the body and better bone health [R, R, R, R].

Sunlight is our main source of vitamin D. Foods like fish, eggs, and fortified milk provide small amounts of vitamin D. People lacking vitamin D should consider taking a supplement [R, R, R].

INCREASED NEED

Likely increased need for calcium based on 49,653 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ALDH7A1	rs13182402	AG
FAM216B	rs9525667	CT
GAL	rs880610	GG
CDC42SE1	rs2864700	TT
CTNNB1	rs389264	CC
RSPO3	rs9482772	CC
AMT	rs34240317	DEL(CT)A
GALNT3	rs10204976	GG
CPED1	rs10242100	AA
MRPL20	rs12408050	AG
ARL4C	rs12151790	GG
DOK6	rs17184557	TT
FKBP11	rs3741619	GA
ETS2	rs11088458	AG
HBZ	rs10794639	GA
SMOC1	rs3742909	GA
HOXC6	rs7308105	TC
TNFRSF11B	rs2062375	GC
STK39	rs578031265	CC
MARCO	rs115242848	CC
PRSS3	rs10814041	GG
MN1	rs139959245	CC
NUDT2	rs307646	AA
ARRDC3	rs7733007	GG
CDH6	rs2173682	GA
IDH3A	rs2028548	CC
HLA-DQA1	rs2071805	CC
MECOM	rs784288	GG
VARS2	rs9262558	CC

GENE	SNP	GENOTYPE
SP7	rs144680237	CC
CPED1	rs3779381	AA
ZBTB40	rs34414754	AA
GAL	rs56154705	CC
WLS	rs2566755	TT
SEM1	rs4448201	GG
CCDC170	rs4869744	TT
/	rs12808199	AA

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

Vitamin K

Key Takeaways:

- Genes involved in higher or lower vitamin K levels may influence vitamin K breakdown, fat metabolism, and collagen and bone formation.
- Having low vitamin K levels may contribute to bone health issues like osteoporosis.
- If you are at high genetic risk or lack vitamin K in your diet, taking action now may lower your overall risk for needing it.
- Click the **Recommendations** tab for potential dietary and lifestyle changes. Click the**next steps** tab for relevant labs.

Vitamin K is essential for **blood clotting** and **bone health.** Low vitamin K levels may play a role in osteoporosis and other bone problems. They may also increase blood clotting time, putting people at higher risk of bleeding. Good sources of vitamin K include green leafy vegetables, soy products, carrot juice, and pumpkins [R,R,R].

Genetics may influence vitamin K levels. Some gene variants may be linked to **higher vitamin K levels**. Examples include [R]:

- "G" at rs964184, near the *APOA5* and *ZNF259* genes
- "T" at rs2108622, near the *CYP4F2* gene
- "C" at rs4852146, near the *CTNAA2* gene

On the other hand, variants like rs4645543-T may be linked to **lower vitamin K levels**. It's located near the *COL22A1* and *KCNK9* genes [R].

Genes involved in vitamin K levels may influence [R, R, R, R]:

- Vitamin K breakdown (*CYP4F2*)
- Fat metabolism (*APOA5*)
- Other vitamin K-related genes (*CTNAA2*)
- Collagen and bone formation (*COL22A1*)

Genetically higher levels of vitamin K1 (phylloquinone) may be causally associated with:

- Stroke [R]
- Heart health [R]
- High blood sugar (lower diabetes risk) [R]

Keep in mind that your diet, environment, and other genetic variants also influence your vitamin K levels.

INCREASED NEED

Likely increased vitamin K need based on 11 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
ATG12	rs6862909	TG
CDO1	rs6862071	TA
CDO1	rs4122275	AG
/	rs2192574	TT
SIDT2	rs964184	CC
CTNNA2	rs4852146	TT
CYP4F2	rs2108622	CC
CYP4F11	rs12609820	TT
KCNK9	rs4645543	CC
KCNK9	rs2199565	GG
KCNK9	rs7018214	TT

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

Vitamin D

Key Takeaways:

- Vitamin D is an essential nutrient that you need outside sources of to achieve adequate levels. It is important for mood, immunity, heart health, and blood sugar control.
- Vitamin D levels can be impacted by intensity and amount of sun exposure, age, skin color, and your genetics.
- If you are genetically predisposed to needing more vitamin D, you may want to consider supplementation and addressing possible issues like sun exposure.
- Click the **next steps** tab for relevant labs.

Vitamin D is an essential nutrient. **Your body needs vitamin D for strong bones**. Our skin naturally makes vitamin D when exposed to sunlight. We also get small amounts of vitamin D from foods such as fatty fish, egg yolks, beef liver, and mushrooms [R,R].

Around **20-40%** of differences in people's vitamin D levels may be due to genetics [R].

Genes that influence vitamin D levels may play a role in its [R]:

- Production
- Activation
- Transport
- Breakdown

Besides genetics, the following factors also influence vitamin D levels [R]:

- Sun exposure
- Skin color
- Age

Genetically high vitamin D levels may be causally associated with positive outcomes for:

- Alzheimer's [R,R,R]
- COPD [R,R]
- Uterine fibroids [R]
- Migraines [R]
- Heart Failure [R,R]
- Psoriasis [R]
- Lupus [R]
- Delirium [R]
- Hypertension [R]
- Rosacea [R]
- Total Testosterone [R]
- Muscle loss [R,R]
- Muscle mass [R]
- CRP [R,R]
- Longevity [R,R]
- Lower cholesterol, lipoprotein particles, and phospholipids within VLDL and IDL [R]
- Higher HDL cholesterol [R]
- Lower triglycerides [R]
- Higher adiponectin [R]
- eGFR (lower) [R]
- Primary biliary cholangitis [R]

Genetically lower vitamin D levels may be causally associated with negative outcomes for:

- Multiple sclerosis [R,R,R,R,R,R,R,R,R]

TYPICAL NEED

Likely typical need for vitamin D based on 1,754 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
COPB1	rs2060793	GG
COPB1	rs12794714	AA
COPB1	rs10832289	TT
GC	rs2282679	GT
COPB1	rs10741657	GG
GC	rs7041	AC
CYP1B1	rs1800440	CT
VDR	rs1544410	CT
VDR	rs2228570	GA
/	rs189918701	GG
/	rs558560635	GG
/	rs375984409	GG
PDE3B	rs571484036	AA
COPB1	rs117913124	GG
GC	rs222026	TT
GC	rs4588	TG
VDR	rs731236	AG
GC	rs11723621	GA
PDE3B	rs201501563	TT
RRAS2	rs117206369	TT
/	rs201561609	TT
ADH1B	rs1229984	CT
GC	rs113938679	GG
CYP2R1	rs117576073	GG
/	rs561089663	GG
PSMA1	rs577185477	TT
/	rs557657187	GG
NADSYN1	rs12785878	GG
PSMA1	rs554808052	CC

- Pneumonia [R]
- Gut Inflammation: ulcerative colitis, non-infective colitis, and Crohn's disease [R]
- Lupus [R,R,R]
- Psoriasis R,R]
- Longevity [R,R,R,R,R,R]

A blood test is the only reliable way to determine vitamin D status [R].

GENE	SNP	GENOTYPE
GC	rs565277381	TT
/	rs567415847	GG
/	rs529640451	CC
NADSYN1	rs536006581	AA
COPB1	rs148514005	CC
/	rs185433896	AA
PDE3B	rs188480917	CC
GC	rs3775150	TT
NPFFR2	rs143106299	AA

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

Phosphate

Key Takeaways:

- About **60%** of the differences in people's phosphate levels may be due to genetics.
- Risk factors for high phosphate levels include kidney disease, low parathyroid hormone levels, diabetes, and too much phosphate in the diet.
- Risk factors for low phosphate levels include malnutrition, high calcium levels, low vitamin D or potassium levels, certain medications, and alcoholism.
- Even with a high genetic risk, your overall risk is still low. It is not common for people with normal health and diet.
- Click the **next steps** tab for relevant labs.

About **60%** of the differences in people's phosphate levels may be due to genetics [R].

Genetically higher phosphate levels may play a role in [R, R, R]:

- Some types of heart disease involving the valves
- Artery hardening
- Prostate cancer

Higher phosphate levels are associated with:

- Higher all-cause (46%), cardiovascular (66%), and lung disease (94%) mortality in men but not in women [R]
- Higher all-cause mortality and atherosclerosis (44%) [R]
- Higher mortality in patients hospitalized due to heart failure and kidney disease [R]

TYPICAL LEVELS

Predisposed to typical phosphate levels based on 5 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
NBPF3	rs1697421	CT
IP6K3	rs9469578	CC
C12ORF4	rs2970818	TT
AHI1	rs947583	TT
CSTA	rs17265703	AA

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

Magnesium

Some people may have higher magnesium levels than others. This may be partly due to genetics. Genes involved may influence:

- Magnesium transport in and out of cells [R, R, R, R]
- Magnesium metabolism [R, R]

Genetically higher magnesium levels may be causally associated with:

- Stroke [R]
- Bone health [R]
- Gout [R, R]
- Uric acid [R]
- Cataracts. [R]
- Mood Swings [R]
- Joint Inflammation [R]
- Atrial fibrillation [R]
- Heart Health [R]

TYPICAL NEED

Likely typical need for magnesium based on 31 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
TRPM6	rs11144134	TT
MTMR7	rs3764796	TT
CSTA	rs1801725	GG
FGFR2	rs1219515	GG
RTL1	rs915364	CC
PAPSS2	rs1969821	GG
VIPR1	rs11718502	TC
THBS3	rs4072037	CT
PAPSS2	rs791888	GG
RALGDS	rs7032317	CT
CDKL2	rs6838240	CT
ALPK1	rs2074379	GA
C8ORF48	rs10888073	TC
CANT1	rs11891	GA
THBS3	rs4971100	GA
BORCS7	rs3740393	GC
CDKL2	rs6852678	TC
TRPM6	rs113607577	GG
HDHD2	rs117060920	GG
MPPED2	rs3925584	CC
SHROOM3	rs13146355	GG
SHROOM3	rs9993810	GA
MECOM	rs448378	AG
TRPM6	rs2274924	TT
ASAP1	rs72728275	AA
CAMK1D	rs2648708	CC
FGFR2	rs3135758	CC
CCDC136	rs1472147	TT
METTL21C	rs603894	CC

GENE	SNP	GENOTYPE
PHACTR2	rs2073214	CC
DLK1	rs4905994	CC
OR5BS1P	rs193153567	CC
PRMT7	rs7197653	GG
ATP2B1	rs7965584	AA

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

VDR (Vitamin D)

Among the different *VDR* polymorphisms, rs2228570, also known as FokI, has been most widely researched. Its minor 'A' variant encodes a slightly longer version of the protein associated with decreased VDR levels and activity. In line with this, the major 'G' variant has been associated with [R, R]:

- Better response to vitamin D supplementation
- Better calcium absorption
- Higher bone mineral density
- Reduced risk of fractures

The major variant has also been associated with:

- Increased fat mass [R, R]
- Increased longevity (with mixed results) and better cognition in the elderly [R, R, R]

Another important VDR polymorphism is rs1544410, also known as BsmI. Its minor 'T' allele may have decreased VDR activity and has been associated with:

- Lower BMD and increased risk of osteoporosis [R, R, R]
- Increased risk of scoliosis [R]
- Decreased risk of breast cancer [R]
- Decreased risk of metabolic syndrome [R]

Other *VDR* variants include rs7975232 (ApaI) and rs731236 (TaqI).

Potential effects of VDR variants on dopamine:

- Reduced VDR activity can lead to lower dopamine production because vitamin D helps activate genes that make dopamine
- This may affect dopamine-related functions like mood, focus, and motivation
- The body might have trouble maintaining stable dopamine levels

Potential effects of VDR variants on methylation:

- When VDR activity is reduced, it can affect methylation cycles
- This might impact how well your body processes certain chemicals and nutrients
- The methylation of genes involved in dopamine production and function may be affected

TYPICAL ACTIVITY

Likely typical VDR activity based on the genetic variants we looked at

82%

OF USERS SHARE THE SAME SCORE

You have the same genetic predisposition as **82% of our users.**

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
VDR	rs2228570	GA
VDR	rs1544410	CT
VDR	rs7975232	AA
VDR	rs731236	AG

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

CYP2R1 (Vitamin D)

Several key genetic variants in *CYP2R1* have been associated with vitamin D levels and metabolism:

rs10741657 is a well-studied SNP located in the promoter region of the gene. The **G allele** at this position has been associated with **lower 25(OH)D levels** compared to the A allele. This variant appears to impair the baseline production of the CYP2R1 enzyme, affecting how efficiently the body can convert vitamin D to its circulating form [R, R].

rs12794714 is another significant variant where the **A allele** has been associated with reduced vitamin D levels. This SNP has been linked to an increased risk of **vitamin D deficiency** in various populations. Another variant with similar associations, usually inheriter together with this one, is **rs10766197**-A [R, R].

rs117913124 is a rare variant, for which the **A allele** correlates with **significantly lower** vitamin D levels [R, R].

The impact of these genetic variations is particularly relevant in:

1. Risk assessment for vitamin D deficiency
2. Personalized supplementation strategies
3. Management of conditions related to vitamin D metabolism

These findings have important implications for personalized wellness, suggesting that genetic testing for *CYP2R1* variants might help identify individuals who require higher vitamin D supplementation doses or more frequent monitoring of their vitamin D status.

TYPICAL ACTIVITY

Predisposed to typical CYP2R1 activity based on 5 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
COPB1	rs10741657	GG
COPB1	rs12794714	AA
COPB1	rs10766197	AA
COPB1	rs117913124	GG

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

GC (Vitamin D)

In a meta-analysis of 15 clinical trials and over 30,000 European descendants, **rs2282679** showed the strongest association with vitamin D status. The minor “G” allele correlated with 63% and 49% higher odds of vitamin D insufficiency and deficiency, respectively [R].

The link of this variant with vitamin D deficiency may be independent of age, weight, and other risk factors [R].

This variant may also influence the outcomes of vitamin D supplementation during pregnancy; in 682 white women, each “T” allele correlated with 4.2 nmol/L higher vitamin D levels upon delivery [R].

Two studies of nearly 4,000 participants associated the ‘G’ allele with lower DBP levels [R, R].

Another SNP, **rs4588**, showed comparable effects due to a nearly perfect overlap with rs2282679, so it wasn’t an independent genetic factor [R].

Another SNP with a meaningful impact on vitamin D status is **rs7041**. The above meta-analysis and another review of 17 studies confirmed the association between the “A” allele and lower vitamin D levels [R, R].

This variant may reduce the efficacy of vitamin D supplementation [R, R].

Other GC variants have shown links with vitamin D levels, but the supporting evidence is weak:

- rs17467825
- rs1155563
- rs222020
- rs2298849

HIGHER ACTIVITY

Likely higher GC activity based on 3 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
GC	rs2282679	GT
GC	rs7041	AC
GC	rs4588	TG

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

Recommendations Details

1 Broccoli

Incorporate at least one cup of chopped broccoli, either steamed or raw, into your daily diet. This can be as part of a meal or snack. Continue this practice daily for ongoing health benefits.

Helps with these Symptoms & Conditions:

- High Blood Pressure

Helps with these Goals:

- Immunity

Helps with these DNA Risks:

- Calcium
- Vitamin K

2 Leafy Green Vegetables

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.

Helps with these Symptoms & Conditions:

- High Blood Pressure

Helps with these Goals:

- Immunity

Helps with these DNA Risks:

- Calcium
- Vitamin K

3 Collard Greens

Incorporate at least one cup of cooked or two cups of raw collard greens into your diet 3-4 times a week. Wash the greens thoroughly before use to remove any dirt or pesticides.

Helps with these DNA Risks:

- Calcium
- Vitamin K

4 Spinach

Incorporate one cup of fresh spinach or half a cup of cooked spinach into your daily diet. You can add spinach to salads, smoothies, omelets, or pastas to easily increase your intake.

Helps with these Symptoms & Conditions:

- High Blood Pressure

Helps with these Goals:

- Exercise Recovery
- Immunity

Helps with these DNA Risks:

- Calcium
- Vitamin K

5 Kale

Incorporate at least one cup of kale, cooked or raw, into your daily diet. You can add it to smoothies, salads, or use it as a cooked vegetable side dish.

Helps with these DNA Risks:

- Calcium
- Vitamin K

6 Calcium Supplements

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

Helps with these DNA Risks:

Calcium

7 Calcium Carbonate

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

2500 mg

Helps with these DNA Risks:

Calcium

8 Soy

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.

Helps with these DNA Risks:

Calcium

Vitamin K

9 Swiss Chard

Incorporate Swiss chard into your diet by adding it to salads, sautéing it with olive oil and garlic for a side dish, or mixing it into soups and stews. Aim to eat Swiss chard 2-3 times per week to benefit from its nutrients.

Helps with these DNA Risks:

Calcium | Vitamin K

10 Turnip greens

Incorporate turnip greens into your diet by adding them to salads, sautéing them with garlic for a side dish, or including them in soups and stews. Aim to include turnip greens in your meals 2-3 times a week to benefit from their rich nutrient profile.

Helps with these DNA Risks:

Calcium | Vitamin K

11 Maintain Optimal Vitamin D Levels

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

Helps with these Symptoms & Conditions:

Allergies | Anxiety | High Blood Pressure | Migraines

Helps with these Goals:

Energy | Immunity | Mood | Muscle Growth

Helps with these DNA Risks:

Calcium

12 Vitamin D and Calcium

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.

Helps with these DNA Risks:

- Calcium

13 Chicory

Helps with these DNA Risks:

- Calcium

14 Vitamin K2

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

Helps with these Goals:

- Mood

Helps with these DNA Risks:

- Calcium

15 Salmon

Incorporate at least two servings of salmon into your weekly diet, aiming for each serving to be about 3.5 ounces (100 grams), cooked. Choose wild-caught salmon when possible for higher omega-3 content.

Helps with these Goals:

Immunity

Helps with these DNA Risks:

Calcium