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# Micronutrients 2.0

Client

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Module 1

# Vitamin A

Vitamin A is an essential nutrient that plays a critical role in many aspects of health, including **vision, immune function, and skin health**. This module provides insights into your genetic predisposition for processing and converting two important forms of Vitamin A: Alpha Carotene and Beta Carotene.

Alpha Carotene and Beta Carotene are provitamin A carotenoids that are converted into the active form of Vitamin A, retinol, in the body. However, some people are more efficient at converting these provitamin carotenoids into retinol than others.

Retinol is essential for healthy vision, skin, and immune function. It also plays a crucial role in cell growth and differentiation, making it vital for maintaining healthy tissues and organs.

By understanding your genetic predisposition for processing and converting Alpha Carotene and Beta Carotene, you can take steps to ensure you're getting enough Vitamin A to support optimal health. This module will help you understand how your genetics may affect your ability to convert these provitamin carotenoids into retinol and provide personalized recommendations for optimizing your Vitamin A intake.



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## Alpha Carotene Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this result have a neutral genetic propensity for alpha carotene levels. They are likely to have levels that fall within the normal range for the general population. To maintain optimal health, individuals with this result may benefit from consuming a balanced and varied diet that includes a variety of fruits and vegetables.

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## Beta Carotene Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this result have a neutral genetic propensity for beta carotene levels. They are likely to have average levels of beta carotene and do not have a strong tendency towards either lower or higher levels.

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## Vitamin A Conversion



**Neutral**

### Understanding what this may mean

This result corresponds with neutral conversion of beta-carotene to the active form of vitamin A. While this is the most common result, you may not be likely to maintain sufficient levels of vitamin A and may benefit from consuming foods that are high in beta-carotene such as carrots, sweet potatoes, and dark leafy greens, as well as sources of preformed vitamin A like liver, eggs, and/or cod liver oil. Additionally, some multivitamins have vitamin A in the active forms of palmitate or retinoic acid.

Recommended Supplementation:

<https://us.fullscript.com/o/care-center/products/U3ByZWU6OIByb2R1Y3QtNzlwMzU=/U3ByZWU6OIZh/treatmentPlanId=VHJIYXRtZW50UGxhbi0xMDM0NTQxNQ%3D%3D>

### Genetic Summary <sup>11</sup>

SNP	Marker	Genotype
PKD1L2-BCMO1 G754A	rs6420424	AG
PKD1L2-BCMO1 (G>A)	rs11645428	AG
BCO1 C1136T	rs7501331	TC
BCO1 A801T	rs12934922	AA

SNP	Marker	Genotype
APOA4 T1099A	rs675	TT
FABP2 C163T	rs1799883	TT
SCARB-1 C4T	rs4238001	.
SCARB-1 A1050G	rs5888	AG

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PKD1L2-BCMO1 (T>G)	rs6564851	TG
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LPL C1421G	rs328	CC
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LIPC C-40-517T	rs1800588	CC
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# Non-Vitamin A Carotenoids

Non-Vitamin A carotenoids such as lutein, lycopene, beta-cryptoxanthin, and zeaxanthin are powerful antioxidants that play an essential role in maintaining overall health. This module provides insights into your genetic predisposition for absorbing and metabolizing these carotenoids, enabling you to make informed decisions about your diet and supplementation to ensure optimal health outcomes.

Lutein and zeaxanthin are carotenoids that are found primarily in green leafy vegetables and are essential for maintaining healthy vision. They help protect the eyes from harmful UV radiation and blue light and may reduce the risk of age-related macular degeneration and cataracts.

Lycopene is a carotenoid that is found in high concentrations in tomatoes and other red fruits and vegetables. It has been shown to have powerful antioxidant properties and may reduce the risk of certain types of cancer and cardiovascular disease.

Beta-cryptoxanthin is a carotenoid that is found in many fruits and vegetables, including red peppers, oranges, and peaches. It has been shown to have anti-inflammatory properties and may reduce the risk of lung cancer and other chronic diseases.

By understanding your genetic predisposition for absorbing and metabolizing non-vitamin A carotenoids, you can make informed decisions about your diet and supplementation to ensure that you are getting the maximum benefit from these essential nutrients. This module will help you understand how your genetics may affect your ability to absorb and utilize these carotenoids and provide personalized recommendations for maintaining optimal health.



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## Zeaxanthin Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this result have a neutral genetic propensity for zeaxanthin levels. They may benefit from consuming foods that are high in zeaxanthin, such as leafy green vegetables, to support overall health.

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## Beta-Cryptoxanthin Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this result have a neutral genetic propensity for beta-cryptoxanthin levels. They may benefit from consuming foods that are high in beta-cryptoxanthin, such as oranges, tangerines, and sweet red peppers, to support overall health.

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## Lutein Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this result have a neutral genetic propensity for lutein levels. They are likely to have adequate levels of lutein with a balanced diet that includes lutein-rich foods.

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## Lycopene Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this genetic result are likely to have typical levels of lycopene. Adequate levels of lycopene may help protect against oxidative stress and support overall health.

### Genetic Summary <sup>7</sup>

SNP	Marker	Genotype
LPL C1421G	rs328	CC
PKD1L2-BCMO1 (T>G)	rs6564851	TG
BCO1 C1136T	rs7501331	TC
APOA4 T1099A	rs675	TT

SNP	Marker	Genotype
FABP2 C163T	rs1799883	TT
SCARB-1 A1050G	rs5888	AG
SCARB-1 C4T	rs4238001	.



# B Vitamins

B vitamins play a crucial role in various bodily processes, including energy production, DNA synthesis, and nervous system function. This module provides insights into your genetic predisposition for B vitamin metabolism, including levels of B6, B9 (folate), and B12, as well as MTHFR activity.

Low levels of B vitamins can lead to a range of health issues, including anemia, neuropathy, and birth defects. MTHFR is an enzyme involved in folate metabolism, and genetic variations that affect its activity can lead to reduced folate levels and an increased risk of certain health issues.

By understanding your genetic predisposition for B vitamin metabolism and MTHFR activity, you can take targeted actions to optimize your levels of these important nutrients. This module will help you understand how your genetics may affect your levels of B6, B9, and B12 and provide personalized recommendations for maintaining optimal levels.



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## Vitamin B12 Level Propensity



**Reduced**

### Understanding what this may mean

This result corresponds with a lower genetic propensity for sufficient levels of vitamin B12. Low levels of vitamin B12 can lead to a range of symptoms, including fatigue, weakness, and even anemia. To optimize vitamin B12 levels, individuals with this result may benefit from consuming more foods that are high in vitamin B12, such as fish, eggs, meat, and dairy products. Individuals who follow a vegan or vegetarian diet and those with this genetic propensity likely benefit from supplementation of B vitamins including B12, specifically, the methylcobalamin form.

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## Vitamin B9 Need



**Neutral**

### Understanding what this may mean

Individuals with a neutral genetic propensity for Vitamin B9 (Folate) may have average requirements for this nutrient. It is important to consume a balanced diet that includes folate-rich foods such as leafy green vegetables, legumes, and fortified cereals to meet their daily needs.

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## Vitamin B6 Level Propensity



**Reduced**

### Understanding what this may mean

Individuals with this result may have a genetic propensity for lower levels of vitamin B6. Vitamin B6 plays a key role in the production of neurotransmitters that regulate mood and sleep, so individuals with this result may be at increased risk for sleep disturbances and mood disorders. To support optimal health and sleep, individuals with this result may benefit from increasing their intake of vitamin B6-rich foods or considering a B-complex with 10-20mg of B6.

## Biotin (B7) Deficiency Propensity



**Neutral**

### Understanding what this may mean

This standard risk level suggests that their dietary intake and lifestyle choices play a crucial role in supporting biotin status. To manage this neutral risk, individuals should ensure they consume a balanced diet that includes biotin-rich foods such as eggs, nuts, seeds, and vegetables. Regular dietary intake should be sufficient to meet their biotin needs without the need for additional supplementation beyond standard dietary recommendations.

## MTHFR Activity



**60-70% enzyme activity**

### Understanding what this may mean

Individuals with 60-70% MTHFR enzyme activity have a moderate reduction in enzyme activity and may be at an increased risk for elevated homocysteine levels and associated health problems. However, the risk is generally not as high as for individuals with further reduced enzyme activity. It is still important for individuals with this enzyme activity level to work with their medical providers to ensure adequate intake of folate and other B vitamins and to avoid certain medications that may further decrease MTHFR activity.

## Folic Acid Supplementation Tolerance



**Neutral**

### Understanding what this may mean

Standard benefit from Folic Acid supplementation.

## Genetic Summary <sup>13</sup>

SNP	Marker	Genotype
MTHFR G677A	rs1801133	GG
MTHFR T1298G	rs1801131	GG

SNP	Marker	Genotype
CUBN A758G	rs1801222	GG
TCN1 G79+372A	rs526934	AG

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FUT2 G772A	rs602662	GG
FUT2 A204G	rs492602	AA
FUT2 G461A	rs601338	GG
MTR A2756G	rs1805087	AG
ALPL G473-148A	rs1256335	AA

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NBPF3 C134-911T	rs4654748	CC
DHFR A-473G	rs1650697	GG
DHFR 86+59ins	rs70991108	II
DHFR G243-2490T	rs1677693	TT

# Vitamin C

Vitamin C, an essential nutrient known for its antioxidant properties and role in collagen synthesis, immune function, and wound healing, varies in its absorption and utilization among individuals, partly due to genetic differences. This section explores the genetic factors that influence how the body processes and benefits from Vitamin C, shedding light on the importance of personalized nutrition.

**Genetic Variations Affecting Vitamin C Levels:** Certain genetic variants can impact the efficiency of Vitamin C transporters and enzymes involved in its metabolism, affecting the nutrient's bioavailability and cellular uptake. This can influence an individual's dietary requirement for Vitamin C to maintain optimal health and prevent deficiency-related conditions.

**Implications for Health:** Understanding genetic predispositions related to Vitamin C metabolism can help tailor dietary recommendations, potentially requiring higher intake for those with variants that decrease absorption or increase turnover. This personalized approach aims to leverage the protective effects of Vitamin C against oxidative stress, support immune function, and enhance collagen synthesis for skin health and wound healing.

The exploration of genetics in relation to Vitamin C underscores the broader concept of nutrigenomics, highlighting how individual genetic makeup can guide nutritional strategies to support overall well-being.



## Vitamin C Propensity



**Neutral**

### Understanding what this may mean

Those with a typical Vitamin C propensity exhibit average abilities to utilize and maintain Vitamin C levels, aligning with the general population's capacity. This means their dietary needs for Vitamin C, which supports immune health, collagen synthesis, and antioxidant activity, can typically be met through a balanced diet that includes a variety of fruits and vegetables rich in Vitamin C. Regular consumption of these foods is recommended to support general well-being and health maintenance.

### Genetic Summary <sup>4</sup>

SNP	Marker	Genotype
SLC23A1 C790T	rs33972313	CC
SLC23A1 T379+521C	rs10063949	TC

SNP	Marker	Genotype
SLC23A1 T281-6135C	rs6053005	.
SLC23A1 A207+1767G	rs6133175	GG



# Vitamin D

Vitamin D is an essential nutrient that plays a vital role in bone health, immune function, and overall well-being. This module provides insights into your genetic predisposition for Vitamin D levels, enabling you to take steps to optimize your Vitamin D status and support your overall health.

Vitamin D is often referred to as the "sunshine vitamin" because it is produced by the body in response to sunlight exposure. However, many people do not get enough Vitamin D through sunlight exposure alone and may require supplementation or dietary sources.

Vitamin D deficiency has been linked to a range of health issues, including bone weakness, weakened immune function, and an increased risk of chronic diseases. By understanding your genetic predisposition for Vitamin D levels, you can take targeted actions to optimize your Vitamin D status and reduce your risk of associated health issues.

This module will help you understand how your genetics may affect your Vitamin D levels and provide personalized recommendations for maintaining optimal Vitamin D levels, such as getting adequate sunlight exposure, consuming Vitamin D-rich foods, and supplementing when necessary.





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## Vitamin D Deficiency Risk



**Neutral**

### Understanding what this may mean

Individuals with this genetic result have a neutral risk of developing Vitamin D deficiency and may benefit from monitoring their Vitamin D levels and potentially supplementing if needed, especially if they have limited sun exposure and/or a diet low in Vitamin D.

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## Vitamin D Dietary Absorption



**Neutral**

### Understanding what this may mean

Individuals with this genetic result are likely to have typical absorption of dietary Vitamin D. However, it is still important to consume adequate amounts of Vitamin D through the diet or supplementation to ensure optimal levels. A healthcare provider or coach may be able to provide guidance on appropriate intake levels.

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## Inactive vs Active Vitamin D Correlation



### Reduced

### Understanding what this may mean

Individuals with this genetic result may have a reduced correlation between inactive and active Vitamin D. This could potentially impact the accuracy of using inactive Vitamin D levels to estimate active Vitamin D levels. It may be important to discuss this with a healthcare provider to determine the most accurate way to assess Vitamin D status.

### Genetic Summary <sup>16</sup>

SNP	Marker	Genotype
NADSYN1 G146+1233T	rs12785878	TT
CYP2R1 G177A	rs12794714	AG
CYP2R1 (G>A)	rs10766197	AG
CYP2R1 g.G3442A	rs2060793	AG
GC A56+827G	rs2298849	AA
GC T*26-796G	rs2282679	TT
GC A1296C	rs7041	CC

SNP	Marker	Genotype
CYP2R1 g.C536T	rs1562902	TC
DHCR7 g.T22128C	rs1790349	TT
NADSYN1 G1319+496A	rs3829251	GG
VDR G2A	rs2228570	AG
CYP27B1 G-1260T	rs10877012	TG
VDR C1025-49A	rs7975232	AC
VDR C1024+283T	rs1544410	TC

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GC T58+6190C

rs1155563

TT

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KL T1054G

rs9536314

TT

# Vitamin E

Vitamin E is a group of eight fat-soluble compounds that function as antioxidants in the body, protecting cells from oxidative stress. This module provides insights into your genetic predisposition for processing two forms of vitamin E: alpha-tocopherol and gamma-tocopherol.

Alpha-tocopherol is the most common form of vitamin E found in the body and is known for its antioxidant properties. Gamma-tocopherol is another form of vitamin E found in many plant-based foods and also has antioxidant activity.

Your genes can influence how your body processes and utilizes vitamin E, which can affect your risk of certain health conditions, including cardiovascular disease, cancer, and neurological disorders. Understanding your genetic predisposition for processing alpha-tocopherol and gamma-tocopherol can help you make informed decisions about your diet and supplement use.

This module will provide you with personalized insights into your genetic risk factors for processing alpha-tocopherol and gamma-tocopherol, allowing you to make informed decisions about your vitamin E intake and overall health.



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## Vitamin E Inflammation Risk



**Neutral**

### Understanding what this may mean

Individuals with this result are likely to have standard effects from vitamin E supplementation

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## Vitamin E Absorption



**Ideal**

### Understanding what this may mean

Individuals identified with an ideal absorption rate for Vitamin E efficiently process and utilize this nutrient from their diet. Vitamin E plays a key role in protecting cells from oxidative damage, supporting immune function, and maintaining skin health. Maintaining a balanced diet with sufficient sources of Vitamin E is recommended to leverage this genetic advantage for optimal health benefits.

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## Alpha Tocopherol Level Propensity



**Increased**

### Understanding what this may mean

Individuals with this genetic result may have increased levels of alpha tocopherol. It is important not to exceed safe levels of vitamin E intake to avoid potential adverse effects.

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## Gamma Tocopherol Level Propensity



**Reduced**

### Understanding what this may mean

Individuals with this genetic result may have reduced levels of gamma tocopherol. Consuming more vitamin E-rich foods, particularly those high in gamma tocopherol, may be beneficial. It may also be worth discussing vitamin E supplementation with a provider or coach.

### Genetic Summary <sup>10</sup>

SNP	Marker	Genotype
APOE C388T	rs429358	TC
APOE C526T	rs7412	CC
LIPC C-40-517T	rs1800588	CC
COMT G472A	rs4680	AA
IL-10 T-149+1984G	rs1800872	GG

SNP	Marker	Genotype
IL-10 T-149+2474C	rs1800896	TC
ApoC3 C*40G	rs5128	CC
CETP G118+279A	rs708272	.
GSTP1 A313G	rs1695	AA
TNF G-238A	rs361525	GG

# Electrolytes

Electrolytes are essential minerals that help maintain proper fluid balance and nerve and muscle function in the body. This module provides insights into your genetic predisposition for sodium and potassium sensitivity, as well as magnesium levels, allowing you to make informed decisions about your diet and lifestyle.

Sodium is a critical electrolyte that helps regulate blood pressure and maintain proper fluid balance in the body. However, excessive sodium intake can increase the risk of high blood pressure and other cardiovascular problems. This module can help you understand your genetic predisposition for sodium sensitivity, allowing you to make informed decisions about your sodium intake.

Potassium is another important electrolyte that helps regulate blood pressure and supports proper muscle and nerve function. Low potassium levels can lead to muscle weakness, fatigue, and other health problems. This module can help you understand your genetic predisposition for potassium sensitivity, allowing you to adjust your diet and lifestyle accordingly.

Magnesium is also an important electrolyte that plays a crucial role in nerve and muscle function, as well as bone health. Low magnesium levels can lead to muscle cramps, fatigue, and other health problems. This module can help you understand your genetic predisposition for magnesium levels, allowing you to make informed decisions about your diet and supplement choices.

By understanding your genetic predisposition for sodium and potassium sensitivity, as well as magnesium levels, you can make more informed decisions about your diet and lifestyle, helping you to maintain proper fluid balance, nerve and muscle function, and overall health.



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## Sodium Sensitivity



**Reduced**

### Understanding what this may mean

Individuals with this genetic result may have a reduced sensitivity to sodium, which means they may be able to tolerate higher levels of sodium intake without negative health effects. However, it is still important to consume sodium in moderation and according to individual needs.

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## Potassium Sensitivity and Benefit



**Neutral**

### Understanding what this may mean

Individuals with this genetic result have a neutral sensitivity to the blood pressure-lowering effects of potassium. Adequate potassium intake can help support healthy blood pressure levels in these individuals.

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## Magnesium Deficiency Risk



**Neutral**

### Understanding what this may mean

Individuals with this genetic result have a neutral risk of experiencing magnesium deficiency. It is important to consume a balanced diet that includes magnesium-rich foods or consider supplementation to prevent deficiency.



## Genetic Summary <sup>12</sup>

SNP	Marker	Genotype
MUC1 C66T	rs4072037	CC
ATP2B1 (A>G)	rs7965584	AA
DCDC1 (T>C)	rs3925584	TC
ADD1 G1378T	rs4961	GG
ACE G2328A	rs4343	AG
AGTR1 A1166C	rs5186	AA

SNP	Marker	Genotype
AGTR1 G-48+13974A	rs4524238	GG
NAA10 T386+394C	rs1557501	CC
RENBP G688-61A	rs2269372	AA
SHROOM3 G168-54767A	rs13146355	AG
CYP11B2 G-344A	rs1799998	GG
NR3C2 G2015-8060T	rs6810951	GG

# Choline

Choline is an essential nutrient that plays a vital role in several processes in the body, including cell structure and signaling, nerve function, and metabolism. Adequate choline intake is essential for optimal health, and some people may have a higher need for support than others.

The severity of choline deficiency symptoms can vary depending on many factors, including genetics. Symptoms of deficiency can include muscle damage, liver damage, and neurological disorders. Women who are pregnant or breastfeeding may also require higher choline intake to support the developing fetus or infant. Additionally, some individuals may be at an increased risk of organ dysfunction if they are deficient in choline. For example, a deficiency in choline can lead to liver damage, as choline is required for proper liver function and the metabolism of fats.

Genetic variations can impact the individual's need for choline and their ability to synthesize it. Some individuals may have a variation in the PEMT gene, which reduces their ability to produce choline from other compounds in the body.

Overall, ensuring adequate choline intake is essential for maintaining optimal health and preventing deficiencies and related complications. By understanding genetic risks for choline need and deficiency, it is possible to take targeted actions to maintain and improve overall health. This page will provide understand how genetics may affect choline need, the severity of deficiency symptoms, and the risk of organ dysfunction from a deficiency, and provide personalized recommendations for optimizing health.



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## Choline Need



**Increased**

### Understanding what this may mean

This result corresponds with a higher than average need for choline. It is important to consume sufficient amounts of choline through dietary sources such as eggs or liver, as choline plays a critical role in various physiological processes such as brain function, methylation, nerve function, and metabolism. Additionally, supplementation with choline may be beneficial. 500-1000mg of Alpha GPC or 1000+mg of Phosphatidylcholine are likely to be most effective.

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## Choline Deficiency Severity



**Increased**

### Understanding what this may mean

Individuals with this genetic result may have an increased risk of experiencing severe health consequences associated with choline deficiency such as DNA Damage, muscle damage, and organ dysfunction. It is particularly important to consume adequate amounts of choline through their diet or supplementation to prevent deficiency.

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## Risk of Organ Dysfunction from Choline Deficiency



**Increased**

### Understanding what this may mean

Individuals with this genetic result may have an increased risk of experiencing organ dysfunction associated with choline deficiency. It is particularly to consume adequate amounts of choline through their diet or supplementation to prevent any risk.

### Genetic Summary <sup>11</sup>

SNP	Marker	Genotype
PEMT C-97-6178G	rs12325817	CC
MTHFD1 G1958A	rs2236225	AG
PEMT C634T	rs7946	TC
CHKA C1017-182A	rs7928739	AC
CHKA C351-2951A	rs10791957	AC
CHDH T119G	rs9001	TT

SNP	Marker	Genotype
BHMT G716A	rs3733890	GG
MTHFR T1298G	rs1801131	GG
MTHFR G677A	rs1801133	GG
MTR A2756G	rs1805087	AG
MTRR A66G	rs1801394	AG

# Nitric Oxide

Nitric oxide (NO) is a critical signaling molecule produced by the body that plays a key role in various physiological processes including vasodilation, neurotransmission, immune system activity and cellular communication. This section explores genetic propensities related to nitric oxide production and utilization, providing insights into potential nitric oxide levels and how the body may respond to different factors that affect NO.

Nitric oxide is essential for blood vessel dilation, which helps promote healthy blood flow, cardiovascular function, and overall circulation. Genetics can provide insights into factors that may support or hinder nitric oxide production, such as dietary factors, physical activity, and exposure to environmental pollutants.

Optimal nitric oxide levels are crucial for maintaining cardiovascular health and overall well-being. There are many ways to affect levels, such as lifestyle factors, diet, and targeted supplementation. This may include consuming nitrate-rich foods like leafy greens and beets, engaging in regular physical activity, and adopting a nutrition plan to support nitric oxide production. It's important to remember that lifestyle choices, including exercise and dietary habits, can significantly impact nitric oxide levels and overall cardiovascular health.

By leveraging the insights from genetic predispositions for nitric oxide, and collaborating with healthcare professionals or nutrition experts, a personalized approach can be developed to support nitric oxide production and enhance cardiovascular well-being. Genetic propensities for nitric oxide production can serve as a valuable tool to optimize cardiovascular health and make informed choices to promote long-term well-being.



## Nitric Oxide Production



**Very Low**

### Understanding what this may mean

Individuals with this result may have lower than optimal levels of nitric oxide, which is a molecule that plays a key role in cardiovascular health and blood vessel function. Low levels of nitric oxide have been associated with an increased risk of cardiovascular disease and other health conditions. Lifestyle interventions, such as regular exercise and a healthy diet rich in nitric oxide-boosting foods (such as leafy greens, beets, and garlic), may help increase nitric oxide levels. Consult with a healthcare provider for guidance on nitric oxide supplements or other interventions.

### Genetic Summary <sup>5</sup>

SNP	Marker	Genotype
NOS3 T-786C	rs2070744	TC
NOS3 T894G	rs1799983	TG
NOS3 A-51-898G	rs1800779	AG

SNP	Marker	Genotype
NOS3 G2984+15A	rs891512	AG
NOS3 G3106+11T	rs7830	GG

# Selenium and Iodine

Selenium is a trace mineral that plays an important role in the body's antioxidant defense system, thyroid hormone metabolism, and immune function. It is obtained through the diet and is found in varying amounts in different foods, with Brazil nuts being one of the richest sources.

Genetic variations can impact the body's ability to absorb and use selenium, and some people may have higher requirements than others. Low selenium levels have been linked to a range of health problems, including thyroid disorders, weakened immune function, and increased risk of certain cancers.

Iodine is another trace mineral that is essential for the proper functioning of the thyroid gland. It is necessary for the production of thyroid hormones, which regulate metabolism and are important for normal growth and development. Iodine is mainly obtained through the diet, with seaweed, seafood, and iodized salt being the primary sources.

Genetic variations can affect iodine metabolism, and some individuals may be more sensitive to iodine deficiency than others. Severe iodine deficiency can lead to goiter, hypothyroidism, and other health problems, particularly during pregnancy and early childhood.

It's essential to ensure adequate selenium and iodine intake through a balanced diet or supplementation, especially if you have genetic variations that affect your body's ability to absorb and use these nutrients.





## Selenium Deficiency Severity



**Neutral**

### Understanding what this may mean

Individuals with this genetic result have a typical risk of experiencing significant health consequences associated with selenium deficiency. It is important for individuals to consume adequate amounts of selenium through their diet or supplementation to prevent deficiency.

## Iodine Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this genetic result are likely to have typical levels of iodine. Adequate iodine intake is important for thyroid function, and it is recommended to consume iodine-rich foods or iodine supplements as needed.

## Genetic Summary <sup>3</sup>

SNP	Marker	Genotype
GPX1 G599A	rs1050450	GG
SELENOF C85-2631T	rs561104	TC

SNP	Marker	Genotype
SELENOP C*14T	rs7579	CC



# Iron

Iron is an essential mineral that plays a vital role in the transport of oxygen throughout the body. Iron deficiency can lead to anemia, which is characterized by fatigue, weakness, and shortness of breath. On the other hand, excessive iron accumulation in the body can lead to a condition called hemochromatosis, which can cause liver damage and other complications.

Individuals with a genetic predisposition for low iron levels may be at increased risk for iron deficiency anemia. Blood tests that measure serum iron and transferrin levels can help assess iron status. Low serum iron levels and high transferrin levels may indicate iron deficiency, while high serum iron and low transferrin levels may suggest iron overload.

Iron overload is a genetic condition characterized by excessive absorption of dietary iron, which can lead to iron overload in various organs. Individuals with certain genetic variants, such as the HFE C282Y variant, are at higher risk for developing iron overload. Symptoms may include fatigue, abdominal pain, joint pain, and liver damage.

Iron is found in both animal and plant foods, with animal sources being more easily absorbed by the body. Foods rich in iron include red meat, poultry, fish, beans, lentils, fortified cereals, and spinach. Vitamin C can enhance iron absorption, while calcium and tannins found in tea and coffee can inhibit iron absorption.

Individuals with a genetic predisposition for low iron levels or iron overload may benefit from working with a healthcare provider to optimize their iron status through dietary modifications, iron supplementation, or phlebotomy to reduce iron levels in cases of iron overload.



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## Iron Deficiency Risk



**Low**

### Understanding what this may mean

Individuals with this genetic result have a lower risk of iron deficiency compared to the general population. It is still important to consume adequate amounts of iron through their diet to maintain healthy iron levels.

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## Serum Iron Level Propensity



**Neutral**

### Understanding what this may mean

Individuals with this genetic result are likely to have typical levels of serum iron in their blood.

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## Transferrin Level Propensity



**Below Average**

### Understanding what this may mean

Individuals with this genetic result may have lower than typical levels of transferrin in their blood. It may be beneficial to discuss bloodwork and potential iron supplementation with a healthcare provider.

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## Iron Overload Risk



**Neutral**

### Understanding what this may mean

Individuals with this genetic result have a typical risk of developing iron overload, a condition characterized by excessive iron absorption and accumulation in the body. It is important for individuals to monitor their iron levels and discuss any concerns with a healthcare provider.

### Genetic Summary <sup>12</sup>

SNP	Marker	Genotype
HFE C187G (H63D)	rs1799945	CC
HFE G845A (C282Y)	rs1800562	GG
HFE A193T (S65C)	rs1800730	AA
TMPRSS6 G1563A	rs4820268	AA
BTBD9 G1154+104406A	rs3923809	AG
BMP2 (A>G)	rs235756	AG

SNP	Marker	Genotype
CACNA2D3 T381+454C	rs1868505	TC
HBS1L-MYB (A>G)	rs4895441	AA
HIST1H2B (C>T)	rs13194491	CC
TF G1330+278A	rs3811647	.
TFR2 C473+2339A	rs7385804	AC
TMPRSS6 A*1241G	rs855791	GG

# Copper and Zinc

Copper and zinc are essential trace minerals critical for numerous physiological processes, including immune function, antioxidant defense, and enzyme activity. However, maintaining the proper balance between these minerals is crucial, as imbalances can lead to various health issues. This section explores the genetic factors that influence individual responses to zinc and copper.

Genetic variations can significantly impact how individuals absorb, utilize, and retain zinc. While zinc is beneficial in appropriate amounts, excessive zinc intake can interfere with the absorption of other essential minerals, notably copper, leading to imbalances and adverse health effects. Genetic predispositions affecting zinc homeostasis can make certain individuals more susceptible to zinc toxicity, manifesting as gastrointestinal distress, immune dysfunction, and neurological issues.

Copper and zinc compete for absorption in the gastrointestinal tract, and an excess of one can lead to a deficiency in the other. Genetic variations that impact copper transport and metabolism, such as ATP7B, can exacerbate the risk of copper imbalance. Assessing genetic risk factors for copper imbalance is essential when considering zinc supplementation, especially in individuals predisposed to copper deficiency or toxicity.

Incorporating genetic insights into nutritional planning enables the development of personalized strategies to optimize zinc and copper levels, enhancing health outcomes while minimizing the risk of imbalances. Healthcare providers can recommend specific dietary adjustments, supplementation, and regular monitoring of mineral status based on individual genetic profiles, ensuring that both zinc and copper are maintained within their optimal ranges for health.



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## Copper Imbalance Risk



**High Risk**

### Understanding what this may mean

Those with a high risk for copper imbalance carry genetic predispositions that significantly elevate their likelihood of experiencing issues with copper regulation. This heightened risk can lead to health implications due to copper toxicity. For individuals with a high risk, it's particularly important to closely monitor copper intake, avoid overconsumption of copper-rich foods or supplements without medical advice, and regularly consult healthcare professionals to ensure copper levels are appropriately managed and balanced.

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## Zinc Supplementation Benefit



**Low**

### Understanding what this may mean

Individuals identified with a low benefit from zinc supplementation have a genetic makeup that suggests they may not experience significant improvements in health or well-being from additional zinc beyond normal dietary intake. For these individuals, maintaining adequate zinc levels is likely best achieved through a balanced diet rich in zinc-containing foods such as meat, shellfish, legumes, seeds, nuts, and whole grains. While supplementation may not be harmful, it might not provide additional benefits unless a specific deficiency is diagnosed by a healthcare provider.

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## Risk for Zinc Excess



**Increased**

### Understanding what this may mean

Individuals identified with an increased risk for zinc excess have a genetic predisposition that may lead to a higher likelihood of accumulating toxic levels of zinc when intake exceeds recommended amounts. This heightened risk underscores the importance of careful management of zinc intake, primarily through diet, and cautious use of supplements. Excessive zinc can disrupt the balance of other essential minerals and cause adverse health effects. It's crucial for those with an increased risk to closely monitor their zinc intake and consult with healthcare professionals regarding appropriate supplementation levels.

### Genetic Summary <sup>10</sup>

SNP	Marker	Genotype
ATP7B T2495C	rs1061472	CC
ATP7B C2855T	rs732774	TT
SELENBP1 T4+373G	rs2769264	TG
PPCDC T136-1598C	rs2120019	TT
NBDY C*167-3205T	rs4826508	TC

SNP	Marker	Genotype
CA1 A-99-6199G	rs1532423	AA
IL6/IL6-AS1 (G>C)	rs1800795	CC
SMIM1 A-75-335G	rs1175550	.
SLC30A8 A*813G	rs11558471	AA
SLC30A8 C973T	rs13266634	CC