SelfDecode™

DIO2 (Thyroid)

Gene Report

REPORT CATEGORY

THYROID

Sample Client

Report date: 15 January 2026

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Personal information

NAME

Sample Client

SEX AT BIRTH

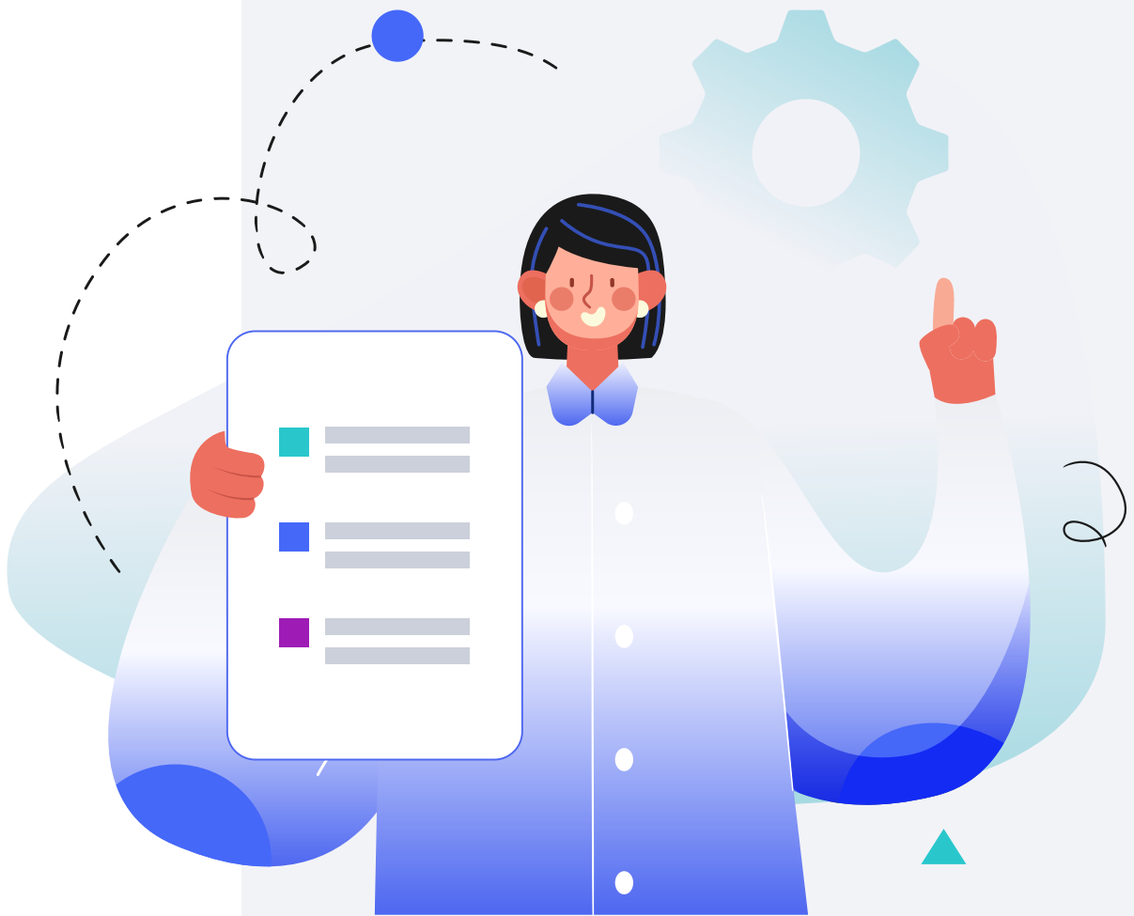
Male

HEIGHT

5ft 5" 165cm

WEIGHT

137lb 62kg

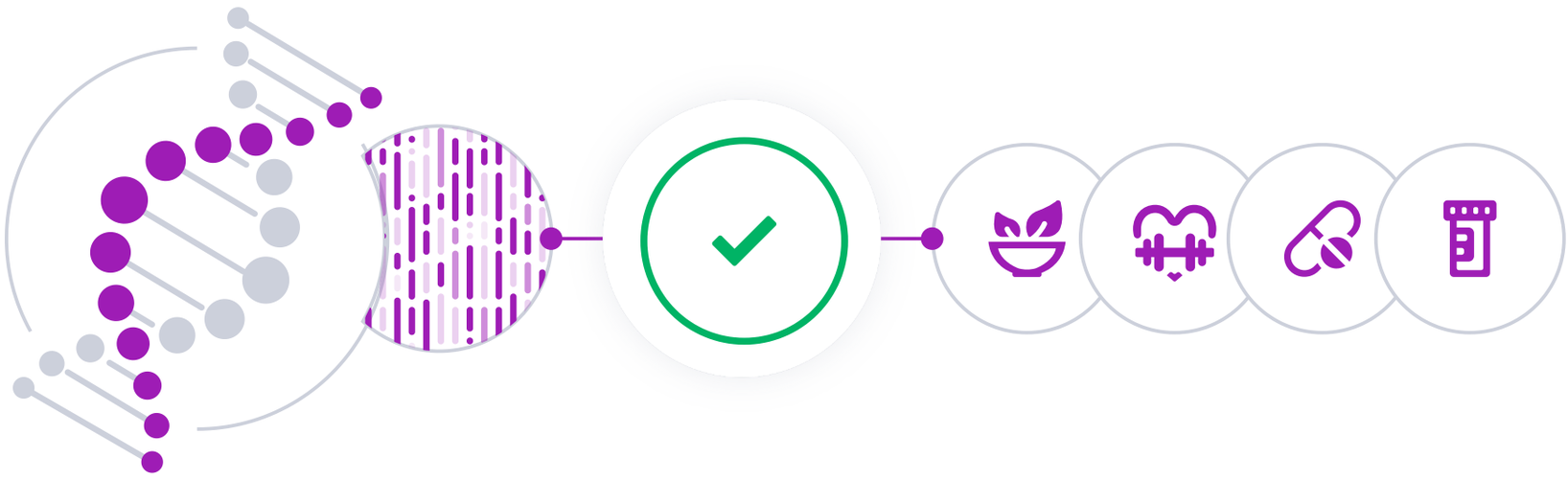


DISCLAIMER

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.

How this works

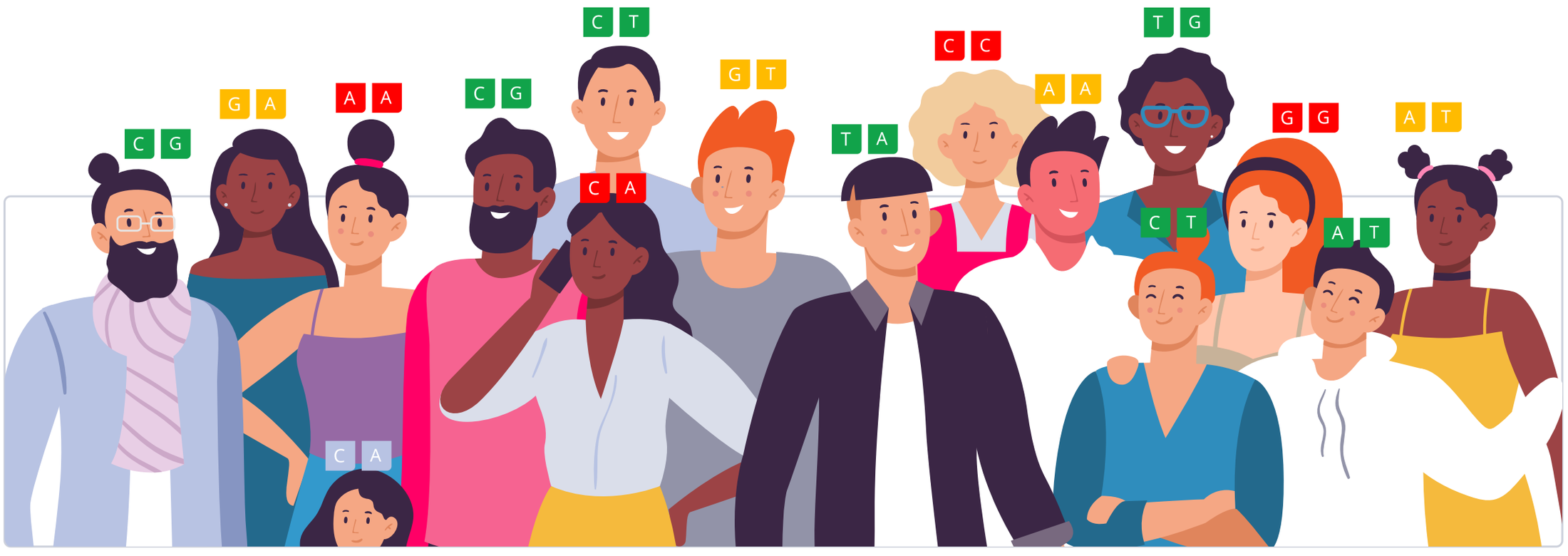
Our Wellness Reports analyze how your DNA influences your health.
We then use this analysis to give you personalized risk estimates and recommendations.



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.

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

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

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, afew 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

The thyroid is a gland found in the front of the neck. It produces thyroid hormones: **T3 (triiodothyronine)** and T4 (thyroxine). These hormones affect [R]:

- Heart function
- Energy production
- Breathing rate
- Bone growth
- Alertness
- Reproductive health

T3 is the active form. It contains 3 iodine atoms, and it's released by T4 breakdown [R, R, R].

The *DIO2* gene encodes an enzyme called iodothyronine deiodinase that converts T4 into T3 by removing one iodine atom from T4 [R].

DIO2 is responsible for T3 production in the thyroid, muscles, brain, heart, and fat tissue. It accounts for up to 60% of all T3 [R, R, R, R].

DIO2 Genetics

At first glance, one might think DIO2 doesn't have much of an impact on thyroid health. Multiple studies failed to make a connection between variations in this gene and thyroid hormone levels [R, R].

However, many people have symptoms of low thyroid hormones despite their lab results being in the normal range ('hidden hypothyroidism'). That *might be* because their thyroid hormones don't function well on a cellular and tissue level, which cannot be measured by blood tests.

One *DIO2* variant may be involved in this phenomenon. The less common "C" allele on rs225014 (Thr92Ala) is associated with:

- Poor response to thyroid meds [R, R]
- Obesity and insulin resistance [R]
- Inadequate blood sugar control [R]
- Impaired cognitive development (lower IQ) [R]

All of the above may indicate low thyroid hormones in DIO2 target tissues such as the brain, fat tissue, and muscles.

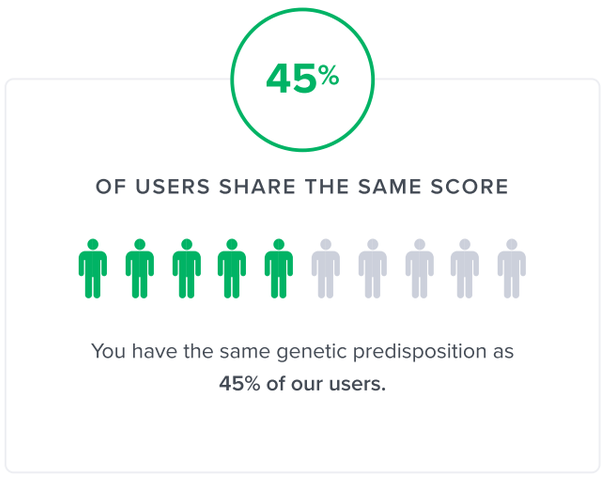
The same DIO2 variant (rs225014) is associated with an inadequate response to thyroid meds in some people. Out of 45 patients, those who carried at least one "C" allele didn't respond as well to standard T4 treatment and were significantly more depressed. They preferred a combination of T4 and T3 (liothyronine) instead [R].

A larger trial came to a similar conclusion, though the effects were significant only for patients who had both copies of the "C" allele [R].

A Dutch study with over 12,600 participants found no connection between DIO2 and thyroid treatment response. However, they didn't investigate the effects of the T4+T3 combination [R].

HIGHER ACTIVITY

Likely higher DIO2 activity based on the genetic variants we looked at



Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
DIO2	rs225014	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
1	Zinc	15 mg
2	Avoid PCBs	
3	Forskolin	500 mg
4	Avoid Strenuous Activity	
5	Aerobic Exercise (Cardio)	1 hour
6	Cold Exposure	1 minutesute
7	Balance Iodine Intake	
8	Avoid Arsenic Exposure	
9	Melatonin	500 mcg
10	Maintain Optimal Iron Levels	10 mg
11	Magnesium	350 mg

1

Zinc

IMPACT 2 / 5

EVIDENCE 2 / 5

How to implement

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

TYPICAL STARTING DOSE

15 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

People with an underactive thyroid may have lower zinc levels [R].

Supplementing with zinc gluconate (30 mg/day, alone or with selenium, for 12 weeks) may increase free T3 levels [R, R].

2

Avoid PCBs

IMPACT 2 / 5

EVIDENCE 2 / 5

How to implement

To avoid PCBs (Polychlorinated Biphenyls), do not use old electrical equipment manufactured before 1977, avoid consuming fish from contaminated waters, especially larger species such as shark and swordfish which are higher in the food chain, and check for and properly dispose of any old fluorescent lighting fixtures that may contain PCBs. Pay attention to local advisories regarding the safety of locally caught fish and wildlife.

Description

PCBs are toxic chemicals that can cause cancer, reproductive problems, and developmental problems. Avoiding exposure to PCBs is important for protecting your health.

Polychlorinated biphenyls (PCBs) are man-made chemicals. They were used in the industry until their **ban in 1979**. PCBs are considered **persistent organic pollutants** (POPS) due to their slow degradation in the environment. They may also **accumulate** in the food chain and the human body [R, R].

We may be exposed to PCBs through contaminated [R, R]:

- **Food** (e.g., fish, meat, rice)
- Soil
- Air

PCBs may have toxic effects on [R, R]:

- Immunity
- Nervous system
- Reproductive system
- Hormone levels

They may also increase the risk of cancer and reduce lifespan [R, R].

How it helps

Being exposed to PCBs (polychlorinated biphenyls) is associated with lower free T3 levels. PCBs may reduce the production of free T3 [R].

3

Forskolin

IMPACT 2 / 5

EVIDENCE 2 / 5

How to implement

Take 250 mg of a 10% forskolin extract twice a day. For best results, consume it on an empty stomach about 15-30 minutes before meals. This regimen should be followed daily for at least 12 weeks to evaluate its effectiveness.

TYPICAL STARTING DOSE

500 mg

Description

Forskolin is a natural compound found in the roots of the Indian coleus plant, and it has been studied for its potential to support weight management and heart health.

Forskolin is a popular supplement and research tool that entered medical practice from Ayurvedic medicine. It is obtained from the dried root of an Indian plant known as *Plectranthus barbatus* or *Coleus forskohlii* [R].

Forskolin is especially popular as a weight loss supplement, but the research behind it is limited [R, R, R].

How it helps

Forskolin is a plant component cherished in Ayurvedic medicine. It increases cAMP, a messenger molecule that boosts DIO2 expression in human thyroid cells [R, R].

Forskolin may also stimulate the thyroid gland and T4 secretion [R, R].

4

Avoid Strenuous Activity

IMPACT 2 / 5

EVIDENCE 2 / 5

How to implement

Refrain from participating in high-intensity physical activities such as running, heavy weightlifting, and high-impact sports. Opt instead for low-impact exercises like walking, swimming, or yoga. It's important to listen to your body's signals and rest as needed, avoiding these strenuous activities until advised otherwise by a health professional.

Description

Avoiding strenuous physical activity in certain medical conditions or during illness can help prevent injury and promote better recovery. It allows the body to conserve energy and supports the healing process.

Strenuous activity is physical activity that requires a lot of effort. Exercise done at 70-85% of a person's heart rate is considered strenuous. Examples include [R]:

- Running, cycling, or swimming at high speed
- Running or hiking uphill
- Jumping rope
- Single tennis
- Sports that involve a lot of running (soccer, basketball, hockey, etc.)

On the other hand, strenuous daily activities include [R]:

- Lifting and carrying heavy objects
- Gardening with heavy digging
- Shoveling snow
- Fast dancing

How it helps

Strenuous cardio exercise (for 1-4 days) may lower free T3 levels by up to 18%. Strenuous exercise may reduce free T3 production [R, R, R, R].

5

Aerobic Exercise (Cardio)

IMPACT 2 / 5

EVIDENCE 2 / 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

Exercise (including cardio) may increase free T3 levels in both healthy people and those with hypothyroidism [R, R, R].

However, strenuous cardio exercise (for 1-4 days) may lower free T3 levels by up to 18% [R, R, R, R].

6

Cold Exposure

IMPACT 2 / 5

EVIDENCE 2 / 5

How to implement

Gradually expose yourself to cold temperatures for short periods, starting with 1-2 minutes and increasing up to 5-10 minutes. This can be achieved through cold showers, outdoor exposure in cold weather, or ice baths. Aim to do this 2-3 times per week.

TYPICAL STARTING DOSE

1 minutesute

Description

Cold exposure, when done safely and gradually, can have potential health benefits like increased calorie burn, improved circulation, and enhanced resilience to cold temperatures. Cold exposure techniques, such as cold showers or outdoor winter activities, may help boost metabolism and promote overall well-being when practiced mindfully.

Please note: rapid instead of gradual cold exposure causes dangerous, and even fatal, changes in the breath and heart rates, known as the cold shock response. Be cautious with any form of sudden temperature change in your environment, especially if you have heart disease or other chronic conditions [R].

How it helps

According to animal trials, cold exposure can boost DIO2 gene expression in brown fat/adipose tissue (BAT) by **10-50 times** [R, R].

Unlike white fat tissue, BAT stimulates fat burning and energy production. Cold exposure stimulates DIO2 to produce T3, which is essential for this effect to take place [R, R, R].

In one clinical trial, acute cold exposure also raised blood levels of T3 [R].

Cold showers are the easiest way to practice cold exposure all year long and potentially enhance DIO2.

7

Balance Iodine Intake

IMPACT 2 / 5

EVIDENCE 2 / 5

How to implement

To balance iodine intake, consume foods rich in iodine such as fish, dairy, and eggs, aiming for about 150 micrograms per day for adults. Consider using iodized salt in cooking, but be mindful not to exceed the daily limit. Regularly assess iodine levels, especially if you are pregnant, lactating, or have thyroid issues.

Description

Iodine intake is essential for thyroid function and is obtained through iodized salt and foods like seafood and dairy products. Balanced iodine intake is necessary to prevent thyroid disorders.

Iodine is an element that helps make thyroid hormones. It's important for [R, R, R, R]:

- Thyroid function
- Healthy pregnancy
- Cognitive function

Iodine can be found in foods like [R]:

- Seaweed
- Enriched bread
- Fish (cod)
- Dairy
- Iodized salt

Adults should be getting **150 micrograms** of iodine per day. People who are deficient can take iodine as a supplement. However, most people in the US and other developed countries don't need to take extra iodine. Excess iodine can be harmful [R, R].

How it helps

Iodine deficiency may decrease T3 levels. The negative effects of iodine deficiency on thyroid hormones are reversible upon supplementation. Causes of iodine deficiency include [R, R, R, R, R, R]:

- Lack of salt iodization
- Pregnancy
- Restrictive diets (e.g., vegan diet, very low-salt diet)

Iodine doses over 500 µg/day may also lower free T3 by reducing its production. People who consume large amounts of seaweed may have a higher risk of iodine excess [R, R, R, R, R, R, R].

Thus, it is essential to maintain a balanced iodine intake.

Please note: *Iodine supplementation can be harmful and may make hypothyroidism worse. Supplement only if deficient and instructed by your doctor.*

8

Avoid Arsenic Exposure

IMPACT 2 / 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

In one study, consuming seafood contaminated with arsenic (150 g/day for 2 weeks) lowered T3 levels [R].

Arsenic may reduce free T3 levels by lowering its production from T4 [R, R].

9

Melatonin

IMPACT 1 / 5

EVIDENCE 1 / 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

Try to increase melatonin and fine-tune your circadian rhythm by limiting blue light after sunset and getting enough sunlight during the day [R, R, R].

This may stimulate DIO2 and improve other aspects of thyroid health, too. Poor sleep quality and sleep deprivation initially increase thyroid hormones but exhaust them in the long run [R, R, R].

10

Maintain Optimal Iron Levels

IMPACT 1 / 5

EVIDENCE 1 / 5

How to implement

Check your iron levels. If they are below optimal, take a 10 mg iron supplement daily, preferably with a meal to enhance absorption and reduce stomach upset.

TYPICAL STARTING DOSE

10 mg

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]:

- Women
- Children
- Vegetarians
- Routine blood donors

Iron supplements are available for people who can't meet their needs through a balanced diet, but they should not be taken without consulting a doctor.

How it helps

There is a two-way relationship between iron and thyroid hormones.

Iron plays a role in the metabolism of thyroid hormones and may help the body use iodine [R, R, R].

In turn, thyroid hormones help the body absorb iron [R, R].

Iron deficiency is associated with decreased free T3 levels. However, not all studies found this link [R, R, R].

Supplementing with iron may help restore normal thyroid function in iron-deficient people [R, R, R, R, R, R].

Iron may help by supporting T3 production [R].

Please note: *A high dose of iron can be toxic. If you are not deficient, it is best to get iron from food. Talk to your doctor before taking iron supplements* [R].

11

Magnesium

IMPACT 1 / 5

EVIDENCE 1 / 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

350 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

According to one study, supplementation with magnesium for 4 weeks may prevent the drop in free T3 levels after strenuous exercise [R].

Please note: *Magnesium supplements should not exceed 350 mg/day of elemental magnesium. Higher doses may cause diarrhea, nausea, and abdominal cramps. In addition, magnesium supplements may interact with some medications, including antibiotics and "water pills" (diuretics)* [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.

T4 Free (FT4)	1.26 ng/dL	0.8 – 1.6	9 Nov 2025
TSH	2.76 mcIU/mL	0.4 – 1.5 – 2.5 – 4.5	9 Nov 2025
T4 (Thyroxine), Total	7.27 mcg/dL	4.9 – 10.5	9 Nov 2025
T3, Free (FT3)	3.34 pg/mL	2.3 – 3 – 4.7	9 Nov 2025
Thyroglobulin Antibodies	49 IU/mL	0 – 20	9 Nov 2025
T3 Total	0.95 ng/mL	0.6 – 0.8 – 2	9 Nov 2025
Thyroid Peroxidase Antibodies (TPO)	3.03 IU/mL	0 – 9	9 Nov 2025