

STAT3 (Th1/Th17)

Gene Report

REPORT CATEGORIES —



INFLAMMATION &
AUTOIMMUNITY



IMMUNITY &
INFECTIONS

Sample Client

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DISCLAIMER

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

Personal information

NAME

Sample Client

SEX AT BIRTH

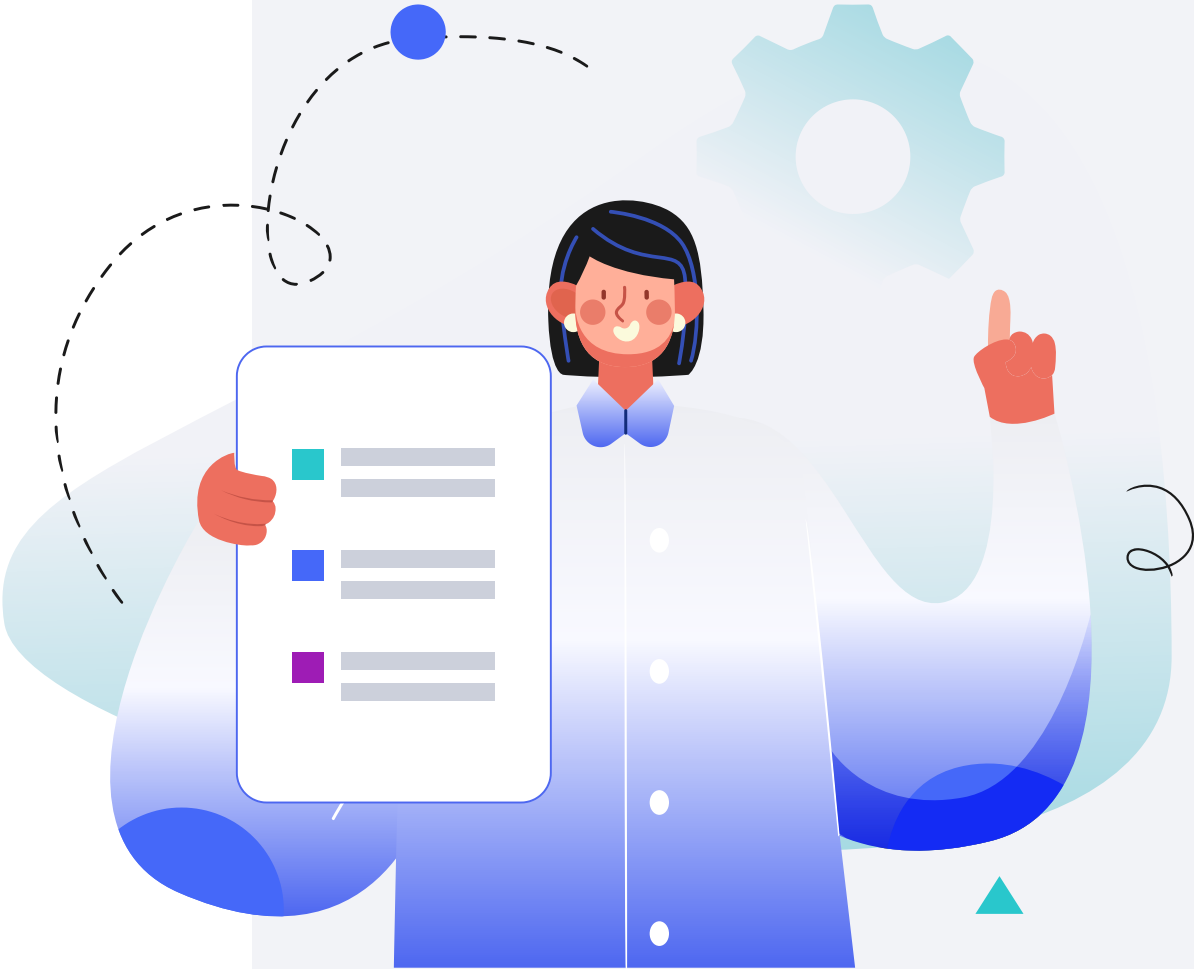
Male

HEIGHT

5ft 5" 165cm

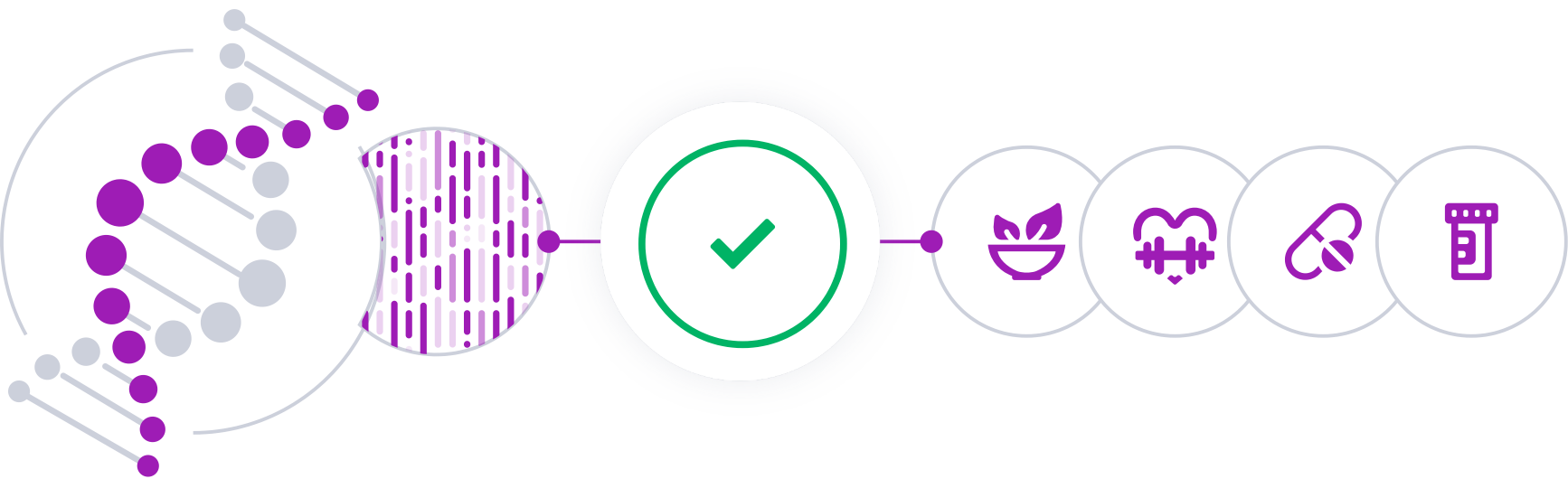
WEIGHT

137lb 62kg



How this works

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

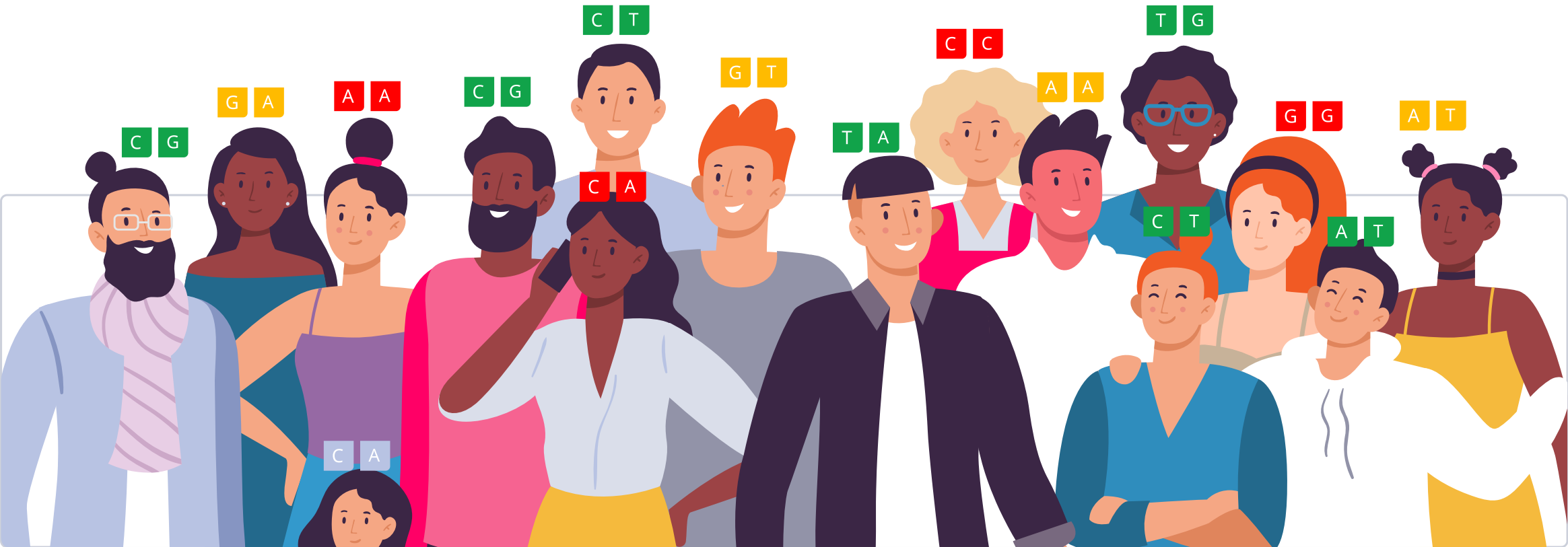


Similarly, our Trait Reports look at how your DNA influences your traits.



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

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



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

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

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



Genotype color info:

AA

You don't have any risk alleles

AA

You have 1 risk allele

AA

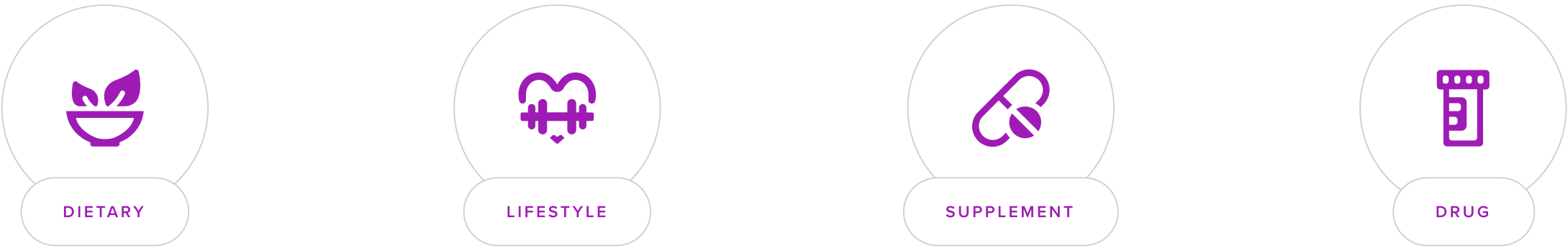
You have 2 risk alleles

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

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

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

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



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

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



Impact

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

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

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

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

Recommendation Evidence

5 / 5

Recommendations that are considered effective and generally recommended by experts and medical bodies.

4 / 5

Recommendations that are considered likely effective and that have multiple independent meta-analyses and a great many studies supporting them.

3 / 5

Recommendations that are considered possibly effective and have many studies supporting them

2 / 5

Recommendations that have insufficient evidence, with two or several clinical trials supporting them, or many studies but with ambiguous results.

1 / 5

Recommendations that have insufficient evidence, with a single clinical trial, or with many studies most of which didn't find support for the recommendation.

0 / 5

No evidence in humans.

Genotype-specific Evidence

High-quality

Direct evidence that a recommendation helps more in people with your gene variant (many clinical trials, a few large clinical trials, or a meta-analysis).

Medium-quality

Direct evidence that a recommendation helps more in people with your gene variant (a few clinical trials or one large clinical trial).

Low-quality

Direct evidence that a recommendation helps more in people with your gene variant (a single clinical trial or more trials with inconsistent results).

Indirect

A recommendation may help more in people with your gene variant because it targets a specific gene or protein affected by your variant (e.g., MTHFR, dopamine).

In theory

A recommendation may help more in people with your gene variant because it targets a specific mechanism affected by your variant (e.g., inflammation, oxidative stress).

Some things to keep in mind:

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

Introduction

The [STAT3](#) gene codes for one member of a family of proteins called *signal transducer and activator of transcription*, or just “STAT” for short. Upon activation by other proteins (such as [JAK](#)), STAT proteins bind to DNA to turn certain genes “on” or “off” [\[R\]](#).

When it comes to the STAT3 protein specifically, its main role is to control the expression of genes involved in the growth, development, and activation of immune system cells. This process is triggered by “messenger molecules” called *cytokines*. While STAT3 responds to many different cytokines, some of the main ones include [IL-6](#), [IL-10](#), [IL-21](#), and [IL-23](#) [\[R\]](#), [\[R\]](#), [\[R\]](#).

On the one hand, STAT3 activates the immune system by contributing to the development and function of the following immune cells:

- [Th17 cells](#) [\[R\]](#), [\[R\]](#), [\[R\]](#)
- [Neutrophils](#) [\[R\]](#), [\[R\]](#)
- Dendritic cells [\[R\]](#)
- B-cells [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Memory T-cells [\[R\]](#), [\[R\]](#)

STAT3 also activates the immune response by reducing the production of immunosuppressive T-cells (also known as “Tregs”) [\[R\]](#).

On the other hand, STAT3 can also act as an immunosuppressant by:

- Increasing the expression of its own blocker (*SOC3*) [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Preventing the development of dendritic cells [\[R\]](#)
- Blocking the production of pro-inflammatory cytokines by [white blood cells](#) (neutrophils, macrophages, and dendritic cells) [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Producing the B-cells that suppress defense and autoimmunity (commonly known as “Bregs”) [\[R\]](#)
- Helping Tregs block [Th17](#) development [\[R\]](#), [\[R\]](#)

STAT3 Genetics

The most widely-studied *STAT3* polymorphism is [rs744166](#). Although its mechanism remains unknown, some researchers have suggested that the minor ‘G’ variant may alter the structure of the STAT3 protein. This may favor its interaction with some cytokines, leading to an increased activation of the immune system [\[R\]](#).

Its minor allele has been associated with an increased risk of the following autoimmune diseases:

- [Multiple sclerosis](#) [\[R\]](#), [\[R\]](#), [\[R\]](#)
- [Psoriasis](#) and psoriatic arthritis [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Vitiligo [\[R\]](#)
- Systemic lupus erythematosus [\[R\]](#)

However, the major ‘A’ variant has been associated with an increased risk of [IBD](#) (both Crohn’s disease and ulcerative colitis). Cell-based research suggests that STAT3 activation in the gut lining promotes wound healing, kills infectious bacteria, and reduces inflammation, which might explain this association [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Similarly, this variant has been associated with a decreased risk of [autoimmune thyroid disorders](#) such as Hashimoto’s thyroiditis and Grave’s disease in some ethnicities but not in others [\[R\]](#), [\[R\]](#), [\[R\]](#).

Alternatively, the ‘G’ allele of this variant has been associated with abdominal obesity and increased [weight gain](#) from saturated fat intake [\[R\]](#).

Another polymorphism of this gene is [rs2293152](#). Its minor ‘G’ allele was associated with increased frequency and severity of IBD (Crohn’s disease, ulcerative colitis, or both) in three different studies, but not in a fourth one [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

In contrast, the major ‘C’ allele was the one associated with multiple sclerosis in two studies (but only statistically significant in one of them). Although the mechanism of this variant is unknown, the fact that its effects are the opposite of those of [rs744166](#) suggests the minor variant may decrease STAT3 activity [\[R\]](#), [\[R\]](#).

The minor ‘G’ allele of another variant, [rs4796793](#), reduces *STAT3* expression. In a Chinese population, this allele was less common among people with Crohn’s disease.



Likely typical STAT3 activity based on 5 genetic variants we looked at

Your top variants that most likely impact your genetic predisposition:

GENE	SNP	GENOTYPE
STAT3	rs3816769	TT
STAT3	rs4796793	CC
STAT3	rs2293152	GC
STAT3	rs744166	AA
STAT3	rs1053005	TT

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

However, this variant was unrelated to ulcerative colitis [\[R\]](#), [\[R\]](#), [\[R\]](#).

The major ‘T’ allele of another *STAT3* polymorphism, [rs3816769](#), was associated with both Hashimoto’s and Graves' disease in a Polish study. People with autoimmune thyroid disorders had ‘TT’ over 6 times more frequently than ‘CC’ [\[R\]](#)!

Finally, the minor allele ‘C’ allele of [rs1053005](#) was more common in people with either Hashimoto’s or Graves' disease in a Chinese study. This allele increases STAT3 production, which could contribute to autoimmune thyroid issues by over-activating the immune system [\[R\]](#), [\[R\]](#).

Your Recommendations

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

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

DOSAGE		DOSAGE	
1	Exercise At Least One Hour a Day	1 hour	
2	Relaxation Techniques	30 minutes	
3	Maintain Optimal Vitamin D Levels	1000 iu	
4	Omega-3 (Fish Oil)	2000 mg	

1



Exercise At Least One Hour a Day

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

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

TYPICAL STARTING DOSE

1 hour

Description

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

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

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

How it helps

[Exercise](#) may be a healthy way to increase the expression of *STAT3*, especially in older adults [\[R\]](#).

Exercise, especially cardio, may also improve physical fitness, metabolism, fatigue, inflammation, and complications in people with the following autoimmune conditions:

- Multiple sclerosis [\[R, R, R, R, R, R, R\]](#)
- IBD [\[R, R, R, R\]](#)
- Psoriasis [\[R\]](#)
- Lupus [\[R\]](#)
- Hashimoto's disease [\[R, R, R, R\]](#)
- Graves' disease [\[R\]](#)

2



Relaxation Techniques

IMPACT

3 / 5

EVIDENCE

3 / 5

How to implement

Incorporate relaxation techniques such as deep breathing exercises, meditation, or yoga into your daily routine. Spend at least 15-30 minutes each day practicing one of these techniques, preferably in a quiet, comfortable space without interruptions.

TYPICAL STARTING DOSE

30 minutes

Description

Relaxation techniques encompass various methods like deep breathing, yoga, meditation, and progressive muscle relaxation, aimed at reducing stress and promoting mental and physical relaxation. Practicing these techniques regularly can help manage stress, improve mental clarity, and enhance overall emotional well-being.

We all get stressed from time to time.

[Stress](#) can help you deal with a challenge or avoid danger. However, **it’s not healthy to be stressed for a long time** [\[R\]](#), [\[R\]](#).

Relaxation techniques such as [yoga](#) and [meditation](#) can relieve stress in different ways. Most of them focus on breathing and help you get rid of negative thoughts and emotions [\[R\]](#).

People use relaxation techniques to improve conditions like [\[R\]](#), [\[R\]](#), [\[R\]](#):

- Anxiety
- Depression
- Chronic pain

Progressive muscle relaxation is another relaxation technique. In this technique, you focus on tensing and relaxing different parts of your body. It is common to start with the toes and slowly work your way up to the neck and head [\[R\]](#), [\[R\]](#).

Autogenic training is a relaxation technique that a person may carry out on their own. It uses exercises that take the mind’s attention to bodily sensations such as warmth and heaviness [\[R\]](#), [\[R\]](#).

How it helps

Chronic [stress](#) activates STAT3 and shifts the immune balance towards [Th2 dominance](#), potentially increasing the risk and severity of autoimmune conditions [\[R\]](#).

In line with this, stress may contribute to the severity and flare-up onset in people with autoimmune conditions such as lupus, vitiligo, psoriasis, IBD, or Graves' disease [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

Relaxation techniques such as progressive muscle relaxation, mindfulness, or mediation may help with these conditions [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#).

3

Maintain Optimal Vitamin D Levels

IMPACT

2 / 5

EVIDENCE

2 / 5

How to implement

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

TYPICAL STARTING DOSE

1000 iu

Description

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

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

- Mood
- Immunity
- Heart health
- Blood sugar control

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

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

How it helps

Ultraviolet radiation from [sunlight](#) has been found to lower the immune response — partly by itself and partly by stimulating [vitamin D](#) production. Sunlight has also been reported to reduce the levels of pro-inflammatory Th17 and Th1 cells while boosting immunosuppressive Tregs [\[R\]](#), [\[R\]](#), [\[R\]](#).

Vitamin D deficiency has been associated with worse symptom severity in people with the following autoimmune conditions:

- IBD [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Psoriasis [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Multiple sclerosis [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Hashimoto's disease [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)
- Vitiligo [\[R\]](#), [\[R\]](#), [\[R\]](#)

Supplementation with vitamin D may help in some cases.

4



Omega-3 (Fish Oil)

IMPACT

1 / 5

EVIDENCE

1 / 5

How to implement

Take 1-2 g of omega-3 (fish oil) supplement daily, preferably with a meal to enhance absorption.

TYPICAL STARTING DOSE

2000 mg

Description

Omega-3 fatty acids are essential fats found in fatty fish like salmon, flaxseeds, and walnuts. They are known for their potential cardiovascular and brain health benefits, including reducing the risk of heart disease and supporting cognitive function.

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

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

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

- Salmon
- Tuna
- Herring
- Sardines

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

How it helps

In mice, dietary omega-3 reduced Th17 development, in part by preventing IL-6 from activating STAT3 [\[R\]](#).

Supplementation with omega-3s may improve the following autoimmune conditions:

- Psoriasis [\[R\]](#), [\[R\]](#), [\[R\]](#)
- IBD [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#), [\[R\]](#)